COURSE CONTENT

Bachelor of Land Resource Management
(Based on the 2020 Curriculum)

DEPARTMENT OF SOIL SCIENCE AND LAND RESOURCE
IPB UNIVERSITY

2024

Contents

Remarks:

Semesters 1 and 2 are centrally managed by *Program Pendidikan Kompetensi Umum* (PPKU, Education Program for Common Competency), known as Tingkat Persiapan Bersama (Common Preparation Year), similar to the Foundation Year in some universities.
Details available at: https://ppku.ipb.ac.id/ .
Community Service (between Semester 6 and 7) is a mandatory to all IPB students, also managed centrally by the university.
Semester 7 is set as a free independent study; details are available in the SAR document. Therefore, details of Semester 7 is absent in this handbook.

SEMESTER 1

KIM1104: Chemistry for Science and Technology

A. Module Identity

1	Course Name	Chemistry for Science and Technology
2	Course Code	KIM1104
3	Credit	3(2-1)
4	Semester	1
5	Pre-requisite	-
6	Coordinator	Dr. Auliya Ilmiawati, MSi
7	Lecturers	Drs. Ahmad Sjahriza M.Si. Armi Wulanawati S.Si., M.Si. Dr. Auliya Ilmiawati S.Si., M.Si. Betty Marita Soebrata S.Si, M.Si. Dr. Dra. Charlena M.Si. Dr. Deden Saprudin S.Si., M.Si. Prof. Dr. Dra. Dyah Iswantini M.Sc.Agr. Prof. Dr. Dra. Eti Rohaeti MS. Dr. Dra. Gustini Sy. M.S. Dr. Henny Purwaningsih S.Si., M.Si. Prof. Dr. Irmanida Batubara S.Si., M.Si. Dr. Drs. Komar Sutriah M.Si. Dr. Mohammad Khotib S.Si., M.Si. Prof. Dr. Mohamad Rafi S.Si., M.Si. Dr. Drs. Muhammad Farid M.Si. Dr.rer.nat Noviyan Darmawan S.Si., M.Sc. Novriyandi Hanif S.Si., M.Sc, D.Sc. Prof. Dr. Dra. Purwantiningsih M.S. Rudi Heryanto S.Si., M.Si. Dr. Dra. Sri Mulijani M.Si. Sri Sugiarti S.Si., Ph.D Dr. Tetty Kemala M.Si. Trivadila S.Si., M.Si., Ph.D. Dr. Wulan Tri Wahyuni S. S.Si., M.Si. Dr. Zaenal Abidin S.Si., M.Agr. Zulhan Arif S.Si., M.Si.
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40%

		c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
3	4.5	28		42				

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 1 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To understand Chemistry as the Central of Science for Science and Technology (IPTEK) in the fields of agriculture, marine science, and tropical bioscience.
2. To apply the basic concepts of Chemistry to design the structure, dynamics, and rate of change in life systems related to energy exploration for the future.
3. To communicate and express opinions and ideas logically to solve problems and appreciate the opinions of others.
4. To collaborate and cooperate through teamwork while considering aspects of safety, health, and the environment.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
A.	**Lecture**		
1.	Students will be able to: a. Explain the contribution of Chemistry to the world as the Central of Science in various aspects of life, such as inventions and technological advancements, and their applications in various fields, especially agriculture, marine, and tropical biosciences, b. Propose new ideas for sustainable development through the application of scientific methods.	Video Presentation, Lecture, Interactive Class Discussion, Review of Discussion Results	Interactive discussion
2.	Students will be able to:	Video	Class participation, Interactive discussion

	a. Design, model, and determine parameters of material stability. b. Explain the influence of chemical architecture on biological function, agrochemistry, and technology.	Presentation, Lecture, Interactive Class Discussion, Review of Discussion Results	
3.	Students will be able to: a. Explain intermolecular interactions and their roles in the behavior of matter states: gas, liquid, solid, and plasma b. Provide examples of applications in the fields of agriculture, tropical biosciences, and marine sciences	Video Presentation, Lecture, Interactive Class Discussion, Review of Discussion Results	Class participation, Interactive discussion
4.	Students will be able to use stoichiometry concept as the basis for calculations and atom economy.	Video Presentation, Lecture, Interactive Class Discussion, Review of Discussion Results	Class participation, Interactive discussion
5.	Students will be able to apply the concept of stoichiometry of solutions in the fields of food, health, and environment.	Video Presentation, Lecture, Interactive Class Discussion, Review of Discussion Results	Class participation, Interactive discussion
6.	Students will be able to explain energy and its involvement in the changes of matter, including equilibrium phenomena.	Video Presentation, Lecture, Interactive Class Discussion, Review of Discussion Results	Class participation, Interactive discussion
7.	Students will be able to: a. Remember and understand all pre-midterm exam lecture material (meetings 1 to 6). b. Analyze and solve practice questions in preparation for midterm exam	Review of lecture materials and interactive discussion	Practice Questions
8.	Students will be able to explain energy and its involvement in changes of matter, including the phenomenon of equilibrium.	Video Presentation, Lecture, Interactive Class Discussion, Review of Discussion Results	Class participation, Interactive discussion
9.	Students will be able to explain basic Concepts of Acid- Base, Acid-Base Equilibrium, pH Scale, and the Significance of Buffer Systems in Life including Applications and Implications in Maintaining Biological Systems.	Video Presentation, Lecture, Interactive Class Discussion, Review of Discussion Results	Class participation, Interactive discussion
10.	Students will be able to explain the concept of molecular interactions as a function of time (reaction rate) in a chemical reaction influenced by various conditions that provide	Video Presentation, Lecture, Interactive Class Discussion, Review of Discussion Results	Class participation, Interactive discussion

	information about the mechanism and transition of changes.		
11.	Students will be able to explain the concept of oxidation- reduction as one of the main reactions in chemical and biological systems, and its application in energy storage and generation.	Video Presentation, Lecture, Interactive Class Discussion, Review of Discussion Results	Class participation, Interactive discussion
12.	Students will be able to explain the basic functional groups in organic compounds and the role of functional groups in small molecules and macromolecules that contribute to specific properties in the configuration of life.	Video Presentation, Lecture, Interactive Class Discussion, Review of Discussion Results	Class participation, Interactive discussion
13.	Students will be able to explain organic molecules and polymers that are irreplaceable in human life as/in pharmaceuticals, chemical industry, and agro-maritime field.	Video Presentation, Lecture, Interactive Class Discussion, Review of Discussion Results	Class participation, Interactive discussion
14.	Students will be able to: a. Remember and understand all pre- final exam lecture material (meetings 8 to 13). b. Analyze and solve practice questions in preparation for final exam	Review of lecture materials and interactive discussion	Practice Questions
B.	**Practicum**		
1.	Students will be able to have an understanding and being able to apply safety measures in the chemical laboratory, handling the management of laboratory chemical waste, and adhering to laboratory work rules.	Lecture, Video presentation	-
2.	Students will be able to: (1) Use commonly used glassware in the chemistry laboratory, (2) identify the names and functions of laboratory equipment, (3) apply basic laboratory techniques such as weighing, pipetting, accurately reading liquid volumes, and filtration. (4) Skillfully recognize symbols and hazard properties of chemical substances, (5) read Material Safety Data Sheets (MSDS) effectively, (6) differentiate types of bottles/containers for storing chemical substances,	Introduction of work plan, as well as tools and materials; Procedure Explanation and Demonstration; Laboratory Work; Explanation of practicum report	Laboratory workplan, class participation, report

	(7) explain hazardous chemical reactions.		
3.	Students will be able to: a. Skillfully weigh and prepare solutions from solids b. skillfully perform dilutions of concentrated solutions c. skillfully determine the concentration of solutions using various units, d. skillfully determine the solubility properties of a compound, e. skillfully use glassware, particularly pipettes and volumetric flasks.	Introduction of work plan, as well as tools and materials; Procedure Explanation and Demonstration; Laboratory Work; Explanation of practicum report	Laboratory workplan, class participation, report
4.	Students will be able to: a. distinguish ionic compounds from covalent compounds, b. explain the relationship between the type of bond and molecular structure to the properties of compounds, c. Assemble apparatus for determining the melting point and electrical conductivity of a substance.	Introduction of work plan, as well as tools and materials; Procedure Explanation and Demonstration; Laboratory Work; Explanation of practicum report	Laboratory workplan, class participation, report
5.	Students will be able to: a. determine the final volume of a gas given the initial volume, initial temperature, and final temperature, using the formula derived from Charles's Law, and b. set up the experimental apparatus to demonstrate Charles's Law. c. skillfully determine the phase changes of a substance d. proficiently read phase change diagrams of a substance, e. accurately calculate the energy changes associated with phase transitions of a substance.	Introduction of work plan, as well as tools and materials; Procedure Explanation and Demonstration; Laboratory Work; Explanation of practicum report	Laboratory workplan, class participation, report
6.	Students will be able to: a. Predict equilibrium shifts influenced by concentration and volume;	Introduction of work plan, as well as tools and materials; Procedure Explanation and Demonstration; Laboratory	Laboratory workplan, class participation, report

	b. Recognize chemical changes based on reactions; c. have basic skills in operating the Spectronic 20D+ instrument. d. explain the influence of concentration, temperature, and catalyst on the rate of reaction; e. demonstrate proficiency in identifying changes that occur in the mixture as evidence of a chemical reaction.	Work; Explanation of practicum report	
7.	Students will be able to: a. Understand all pre-midterm exam lecture materials (meetings 1 to 6) b. Analyze and solve practice questions in preparation for midterm exams	Tutorial	Laboratory workplan, class participation, report
8.	Students will be able to: a. skillfully detect the color differences between acids and bases; b. proficiently perform a simple acid-base titration and accurately determine the end point; c. effectively calculate the concentration of the acid-base titration product.	Introduction of work plan, as well as tools and materials; Procedure Explanation and Demonstration; Laboratory Work; Explanation of practicum report	Laboratory workplan, class participation, report
9.	Students will be able to: a. explain the principle of buffer systems in buffer solutions; b. demonstrate proficiency in using the Henderson-Hasselbalch equation to prepare buffer solutions with specific concentrations and pH values from the provided stock solutions; c. Calibrate the pH meter prior to measuring the pH of solutions; d. accurately measure the pH of solutions using a pH meter; e. determine the buffer capacity against the	Introduction of work plan, as well as tools and materials; Procedure Explanation and Demonstration; Laboratory Work; Explanation of practicum report	Laboratory workplan, class participation, report

	addition of strong acids or bases.		
10.	Students will be able to: a. skillfully identify metals that undergo reduction/oxidation reactions with water and acid; b. skillfully identify metals that undergo reduction or oxidation reactions when reacted with other metal ions; c. skillfully identify metals that are useful as anodes and cathodes to prevent corrosion; d. understand simple applications of redox reactions in daily life; e. skillfully assemble electrolysis experimental apparatus.	Introduction of work plan, as well as tools and materials; Procedure Explanation and Demonstration; Laboratory Work; Explanation of practicum report	Laboratory workplan, class participation, report
11.	Students will be able to: a. skillfully recognize simple models of molecules; b. skillfully correlate molecular shape with dipole moment (polarity), bond strength, and bond angle; c. skillfully demonstrates oxidation reactions with the help of molecular models. d. skillfully associate the structure of natural polymers with their properties; e. skillfully demonstrate the physical changes of proteins due to denaturation; f. skillfully demonstrate the process of water absorption changes in synthetic polymers qualitatively through treatment with acids, bases, and metal ions	Introduction of work plan, as well as tools and materials; Procedure Explanation and Demonstration; Laboratory Work; Explanation of practicum report	Laboratory workplan, class participation, report
12.	Students will be able to have the skills to conduct simple chemical experiments using readily available materials and equipment in the surrounding environment.	Showing independent practical video, Group discussion	Video Presentation

13.	Students will be able to remember, understand, and apply all the practical materials that have been worked on from meetings 2 to 12.		Knock – Knock Quiz
14.	Students will be able to: a. Understand all pre-final exam lecture materials (meetings 1 to 6). b. Analyze and solve practice questions in preparation for final exam.	Tutorial and Interactive Discussion	Practice Questions

E. Module contents

Topic	Number of Week(s)	Contact Hours
Lecture		
1. Chemical Inventions that Changed the World 2. Scientific Methods 3. Classification of Matter	1	2
Molecular Architecture Throughout Time a. Development of Atomic Theory b. Periodic Table and Periodic Properties of Elements c. Intramolecular Bonding d. Electronegativity e. Molecular Polarity and Simple Molecular Geometry	1	2
Dynamics of The State of Matters a. State of matter: Gas (Ideal & Real), Liquid, Solid, Plasma b. Intermolecular Interactions c. Phase Diagram of a Single Component (1 component)	1	2
Atomic Economy a. Chemical Equations b. Quantity of Substance (moles) c. Empirical and Molecular Formulas d. Limiting Reactant e. Percent Yield	1	2
Mixtures and Their Technological Aspects a. Solution b. Concentration c. Colligative Properties	1	2
Energy Towards Stability a. The First Law of Thermodynamics b. The Second Law of Thermodynamics	1	2
Chemical Equilibrium and Factors Affecting the Equilibrium	1	2
Acid Base in Life a. Acid Base Theories and Classification of Acids and Bases b. Acidity Level (pH) c. Equilibrium of Weak Acids and Bases and Salts d. Buffer Solutions	1	2
Rate of Change in Living System and its Applications a. Law of Reaction Rate b. Relationship between Concentration and Time c. Determining Factors of Reaction Rate d. Catalysts	1	2
Electrochemistry as Energy Technology for the Future	1	2

a. Redox Reactions b. Galvanic Cells and Cell Diagrams c. Cell Potential d. Electrolysis		
Life – Building Molecules: Organic Chemistry Simple a. Alkane b. Alkene c. Alkyne d. Organohalogen e. Alcohol f. Amine g. Carbonyl functional group h. Ether i. Sulphur	1	2
Life Building Molecules: Polymers a. Carbohydrates b. Proteins c. Nucleic Acids d. Lipids e. Natural Polymers f. Synthetic Polymers	1	2
Practicum		
Health and Laboratory Work Safety	1	3
1. Introduction to Workplace Safety Equipment and Laboratory 2. Introduction to Chemical Substances	1	3
Solution Preparation	1	3
Chemical Bonds: Ionic and Covalent	1	3
1. Gas Laws 2. Phase Changes of Matter and the Energy Involved	1	3
1. Chemistry Equilibrium 2. Chemical Kinetics	1	3
Acid – Base	1	3
Buffer	1	3
Redox Reactions	1	3
1. Molecular Models 2. Polymers	1	3

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Class Participation	Week 1 – Week 14	30%
2.	Projects	Week 12	5%
3.	Assignment	Week 12	5%
4.	Mid Term Examination	Week 7	30%
5.	Final Examination	Week 14	30%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Chang R. 2003. Basic Chemistry- Core Concepts Third Edition. Jakarta: Erlangga
2. Chang R, Goldsby KA. 2014. General Chemistry – The Essential Concepts. New York: McGraw Hill
3. Timberlake KC. 2017. Chemistry – An Introduction to General, Organic, and Biological Chemistry. Los Angeles: Pearson.
4. Suchocki J. 2014. Conceptual Chemistry. Los Angeles: Pearson.

EKO1101: Economics

A. Module Identity

1	Course Name	Economics
2	Course Code	EKO1101
3	Credit	2 (2-0)
4	Semester	1
5	Pre-requisite	-
6	Coordinator	Dr. Sahara
7	Lecturers	Dr. Sahara Prof. Didin S Damanhuri Prof. Parulian Hutagaol Prof. Bambang Juanda Prof. Nunung Nuryartono Dr. Widyastutik Dr. Tony Irawan Dr. Idqan Fahmi Dr. Wiwiek Rindayati Dr. Yeti Lis P Dr. Alla Asmara Dr. Sri Mulatsih Dr. Tanti Novianti Dr. Syamsul H. Pasaribu Ranti Wiliasih, M.Si Heni Hasanah, M.Si Dian V. Panjaitan, M.Si
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0%

		b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
3	3.0	28						

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 1 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To identify economic problems encountered in everyday life.
2. To analyse the behaviour of producers and consumers in the VUCA era and evaluate the potential impact of government policies, especially those related to the agricultural sector (in a broad sense), considering their effects on consumers, producers, and both sectoral and macroeconomic levels.
3. To apply knowledge of basic economic theory to solve problems or formulate decisions in various applied fields.
4. To express their opinions and respect the opinions of others regarding economic knowledge and its application in everyday life.
5. To have a sense of patriotism after learning how to allocate limited resources to meet the needs of all Indonesians.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to identify various problems, activities, actors, and economic phenomena occurring in Indonesia, and relate them to market evolution driven by innovation and technology.	Videos, Lectures, and Discussion	
2.	Students will be able to explain and apply the meaning and determinants of demand and supply	Videos, Lectures, and Discussion	

3.	Students will be able to estimate the magnitude of various types of elasticity and apply them in everyday life.	Videos, Lectures, and Discussion	
4.	Students will be able to link production functions with cost functions and define various types of costs.	Videos, Lectures, and Discussion	
5.	Students will be able to identify how prices are determined in Perfectly Competitive Markets (PPS) and the impact of companies entering or exiting the market.	Videos, Lectures, and Discussion	
6.	Students will be able to identify how prices are determined in a monopoly market and compare it with a perfectly competitive market.	Videos, Lectures, and Discussion	
7.	Student will be able to explain the meaning, development, and impact of the digital economy in Indonesia, including its effects on the agricultural sector.	Videos, Lectures, and Discussion	
8.	Students will be able to explain the phenomena, concepts, and indicators of economic growth, and calculate economic growth using various approaches.	Videos, Lectures, and Discussion	
9.	Students will be able to explain various types of inflation and how to manage its effects.	Videos, Lectures, and Discussion	
10.	Students will be able to explain the meaning and causes of unemployment.	Videos, Lectures, and Discussion	
11.	Students will be able to explain the causes of shifts in the aggregate demand and supply curves, as well as the relationship of the second curve.	Videos, Lectures, and Discussion	
12.	Students will be able to explain the meaning of price stabilization and fluctuations, as well as the importance of government policies used to achieve price stabilization.	Videos, Lectures, and Discussion	
13.	Students will be able to interpret the importance of internal fiscal policy and its impact on the economy.	Videos, Lectures, and Discussion	

14.	Students will be able to link the demand for money with its equilibrium in the money market, explain how monetary policy affects aggregate demand (AD), and critique monetary policy.	Videos, Lectures, and Discussion	

E. Module contents

Topic	Number of Week(s)	Contact Hours
Introduction: a. Economic Problems in Indonesia b. Understanding Economics c. Production Possibilities Curve d. Flow of the Economic Cycle e. Market Evolution: Innovation and Technology	1	2
Demand and Supply: a. Definition and Determinants of Demand b. Definition and Determinants of Supply c. Shifting Demand Curve d. Shifting Supply Curve e. Interaction of Demand and Supply	1	2
Elasticity and Its Applications a. Understand the concept of elasticity in general b. Understand the concept of price elasticity of demand c. Understand variations in the demand curve in relation to elasticity d. Understand the relationship between demand elasticity and total revenue of the seller e. Understand the concept of price elasticity of supply f. Understand variations in the supply curve in relation to elasticity g. Understand the concept of cross elasticity h. Understand the concept of income elasticity	1	2
Production and Costs: a. Production function; marginal product; average product; and their third relationship b. Various costs; the relationship between costs and output	1	2
Determination of Perfect Competition Market (PPS): a. Assumptions in PPS b. Demand Curve, Marginal Revenue, and Profit Maximization in PPS (P = MC) c. PPS Structure in the Long Term	1	2
Price Determination in Monopoly Markets and Comparison with PPS: a. Reasons Why the Market Becomes a Monopoly b. Demand Curve, Marginal Revenue, and Profit Maximization in a Monopoly	1	2

c. Illustration of a Market Approaching Monopoly: Train Services, etc.		
Digital Economy: a. Understanding the Digital Economy b. Development of the Digital Economy in Indonesia c. Impact of the Digital Economy d. The Digital Economy in the Agricultural Sector	1	2
Economic Growth: a. Understanding the Phenomenon of Economic Growth b. Concept of Economic Growth c. Indicators of Economic Growth d. How to Measure Economic Growth	1	2
Inflation: a. Understanding Inflation and How to Calculate It b. Disaggregation of Inflation in Indonesia c. Weaknesses of the Consumer Price Index d. Difference Between CPI and GDP Deflator e. How to Manage Inflation	1	2
Unemployment: a. How to Measure Unemployment b. Reasons for Persistent Unemployment c. Efficiency Wage Theory and How It Helps Explain Unemployment	1	2
Aggregate Demand and Supply: a. Shifts in the Aggregate Demand Curve b. Shifts in the Aggregate Supply Curve c. The Interaction Between Aggregate Demand and Supply	1	2
Price Stabilization Policy: a. Understanding Price Stabilization b. Causes of Price Fluctuations c. The Importance of Price Stabilization d. Policy Instruments for Price Stabilization	1	2
Fiscal Policy: a. Understanding the Importance of Fiscal Policy b. Fiscal Policy Instruments c. How Fiscal Policy Affects Aggregate Demand (AD) d. Multiplier Effects and Crowding Out of Investment	1	2
Monetary Policy: a. Liquidity Preferences b. How Monetary Policy Affects Aggregate Demand (AD) c. Transmission Mechanisms and Monetary Policy Instruments d. Debate Regarding Active Stabilization Policy	1	2

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark

1.	Mid-term examination	Week 8	35%
2.	Final examination	Week 15	35%
3.	Quiz	Week 7 and Week 14	30%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Lipsey RG, Steiner PO, and Purpis DD. 1987. Economics. Harper International Ed 12th
2. Gregory M. 2006. Principles of Economics. Eight Edition.

IPB110C: Innovative Agriculture

A. Module Identity

1	Course Name	Innovative Agriculture
2	Course Code	IPB110C
3	Credit	2 (2-0)
4	Semester	1
5	Pre-requisite	-
6	Coordinator	Prof. Dr. Ir. Hadi Susilo Arifin, M.S.
7	Lecturers	
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit	Contact	Self-study	Other	Total

SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
2	3.0	28						

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 1 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To highlight the importance of agriculture in relation to the continuity of life and the development of human civilization, while identifying both challenges and opportunities.
2. To gain a broad and accurate understanding of agriculture's scope, and to instill pride in being a student in the field of agriculture.
3. To connect the contributions of various scientific fields and their relationships through interdisciplinary, multidisciplinary, and transdisciplinary approaches to agricultural development.
4. To identify various applications of the latest technology in agriculture to meet needs for food, clothing, shelter, energy, and health.
5. To explore creative ideas for developing innovative agricultural solutions that align with individual fields of knowledge and interests.
6. To expose business opportunities and potential within the agricultural sector by implementing innovative technologies that can be applied now and in the future.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to **conclude** the importance of agriculture in maintaining continuity of life and development of human civilization	Lecture, Class Discussion	Mid Term Examination
2.	Students will be able to **classify** various biological and environmental resources to be used as capital for sustainable Indonesian development.	Lecture, Class Discussion	Mid Term Examination
3.	Students will be able to formulate examples of national agrarian resources, patterns of regulation of agrarian resources and policies,	Lecture, Class Discussion	Mid Term Examination

	and problems faced in the agrarian system and agricultural policies.		
4.	Students will be able to **identify** types of environmental services, their use and the problems faced	Lecture, Class Discussion	Mid Term Examination
5.	Students will be able to **formulate** climate change problems/challenges and their relationship to agriculture, as well as explain solution strategies through the application of *Climate Smart Agriculture* (CSA)	Lecture, Class Discussion	Mid Term Examination
6.	Students will be able **to formulate** current and future agricultural development problems/challenges, and explaining solution strategies through integrated and sustainable agriculture.	Lecture, Class Discussion	Mid Term Examination
7.	Students will be able to able to **formulate** problems/challenges related to food, energy and health needs , and efforts can be made to fulfill them.	Lecture, Class Discussion	Mid Term Examination
8.	Students will be able to **explore** the applications of biotechnology in everyday life, in a wider scope in the fields of agriculture, food, energy and health.	Lecture, Class Discussion	Final Examination
9.	Students will be able to **explore** the use of ICT in the field of smart *agriculture.*	Lecture, Class Discussion	Final Examination
10.	Students will be able to **formulate** the role of agricultural extension and breakthrough strategies for ICT-based extension programs.	Lecture, Class Discussion	Final Examination
11.	Students will be able to **identify** business opportunities in the agricultural sector in a broad sense through the use of ICT, the challenges faced in implementing *an agricultural start-up.*	Lecture, Class Discussion	Final Examination
12.	Students will be able to **compare** the concepts of green and blue economy as current development options; and provide examples of its Application.	Lecture, Class Discussion	Final Examination

13.	Students will be able to **formulate** facts about problems and challenges in the agricultural sector in Indonesia ; and can **formulate** innovative solutions according to their respective fields of science.	Lecture, Class Discussion	Final Examination, Group Task, Paper, Presentation

E. Module contents

Topic	Number of Week(s)	Contact Hours
Agriculture and its relationship to human life and civilization	1	2
Biological resources and the environment	1	2
Agromaritime, Agrarian and their policies	1	2
Agro-Ecosystem Services	1	2
Climate-Smart Agriculture	1	2
Integrated and sustainable agriculture	1	2
Food, energy and health	1	2
Biotechnology and its uses	1	2
Smart Agriculture	1	2
Smart Agriculture Extension	1	2
Agriculture Startups	1	2
Green & Blue Economy	1	2
Hot Issue (Future Agriculture 2045), challenges and innovative solutions, current and future agriculture.	2	4

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination	Week 7	30%
2.	Final Examination	Week 14	30%
3.	Group Task	Week 13	15%
4.	Individual Assignment 1	Week 13	15%
5.	Individual Assignment 2	Week 14	15%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. [IPB] Bogor Agricultural University. 2021. Challenges of the Young Generation in Agriculture, Food and Energy. IPB Press.

KOM1102: Computational Thinking

A. Module Identity

1	Course Name	Computational Thinking
2	Course Code	KOM1102
3	Credit	2(2-0)
4	Semester	1
5	Pre-requisite	-
6	Coordinator	Dean Apriana Ramadhan, S.Komp., M.Kom.
7	Lecturers	Ahmad Ridha, S.Kom., M.S. Auzi Asfarian , S.Komp., M.Kom. Dean Apriana Ramadhan, S.Komp., M.Kom. Dr. Eng. Annisa, S.Kom., M.Kom. Dr. Eng. Wisnu Ananta Kusuma, S.T., M.T. Dr. Ir. Sri Wahjuni, M.T. Dr. Karlisa Priandana, ST., M.Eng. Dr. Medria Kusuma Dewi Hardhienata, S.Komp. Dr. Mushthofa, S.Kom., M.Sc. Dr. Shelvie Nidya Neyman, S.Kom., M.Si. Dr. Sony Hartono Wijaya, S.Kom., M.Kom. Dr. Yeni Herdiyeni, S.Si., M.Kom. Firman Ardiansyah, S.Kom., M.Si. Hendra Rahmawan, S.Kom., M.T. Ir. Julio Adisantoso, M.Kom. Lailan Sahrina Hasibuan, S.Kom., M.Kom. Muhammad Asyhar Agmalaro, S.Si., M.Kom. Toto Haryanto, S.Kom., M.Si. Wulandari, S.Komp., M.Agr.Sc.
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
2	3.0	28						

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 1 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To analyse problems and find solutions to these problems using a computational thinking approach.
2. To utilise computational tools that can be used to solve problems.
3. To understand the ethics of using various computational tools in problem-solving.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to: a. Understand VUCA and the challenges of life in the 4.0 era. b. Understand the benefits of using computer technology to solve problems in this era.	Youtube (Asynchronous), Zoom Meeting (Synchronous), E – learning, Social Media (Line, Instagram)	Quiz
2.	Students will be able to have basic ICT literacy.	Youtube (Asynchronous), Zoom Meeting (Synchronous), E – learning, Social Media (Line, Instagram)	Quiz
3.	Students will be able to have knowledge about the ethics of using information and communication technology in the era of Industry 4.0 and the VUCA world.	Youtube (Asynchronous), Zoom Meeting (Synchronous), E – learning, Social Media (Line, Instagram)	Quiz
4.	Students will be able to: a. model a problem simply into input and output, and constraints. b. decompose a problem.	Youtube (Asynchronous), Zoom Meeting (Synchronous), E – learning, Social Media (Line, Instagram)	Quiz

5.	Students will be able to analyse problems presented in case studies and create models for solving them.	Youtube (Asynchronous), Zoom Meeting (Synchronous), E – learning, Social Media (Line, Instagram)	Quiz
6.	Students will be able to analyse problems presented in case studies and create models for problem-solving.	Youtube (Asynchronous), Zoom Meeting (Synchronous), E – learning, Social Media (Line, Instagram)	Quiz
7.	Students will be able to arrange a sequence of steps to solve problems.	Youtube (Asynchronous), Zoom Meeting (Synchronous), E – learning, Social Media (Line, Instagram)	Quiz
8.	Students will be able to: a. compile pseudocode to solve simple problems. b. use block programming.	Youtube (Asynchronous), Zoom Meeting (Synchronous), E – learning, Social Media (Line, Instagram)	Assignment

E. Module contents

Topic	Number of Week(s)	Contact Hours
Understanding the VUCA era	1	2
ICT Literacy	1	2
ICT & Ethics	1	2
Problem Formulation	1	2
Decomposition and Abstraction	1	2
Problem Solving Algorithmic thinking	5	10
Hour of Code: Pseudocode	2	4

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination	Week 7	35%
2.	Final Examination	Week 14	35%
3.	Quiz	Week 1	3.75%
		Week 2	3.75%
		Week 3	3.75%
		Week 4 – Week 6	3.75%
		Week 7	3.75%
		Week 8 – Week 9	3.75%
		Week 10 – Week 12	3.75%

4.	Assignment	Week 13 – Week 14	3.75%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. David Riley, Kenny A. Hun. 2014. Computational Thinking for the Modern Problem Solver. Chapman & Hall.
2. Paul Curzon, Peter W McOwan. 2017. The Power of Computational Thinking. Games, Magic and Puzzles to Help You Become a Computational Thinker. World Scientific.
3. Karl Beeche. 2017. Computational Thinking: A beginner's guide to problem-solving and programming. BCS, The Chartered Institute for IT.
4. George Beekman, Ben Beekman. 2012. Digital Planet: Tomorrow's Technology and You 10e. Pearson.
5. V. Anton Spraul. 2012. Think Like a Programmer: An Introduction to Creative Problem Solving. No Starch Press.
6. Eric Freemen. 2018. Head First Learn to Code: A Learner's Guide to Coding and Computational Thinking. O'Reilly Media

Others:

- https://edu.google.com/resources/programs/exploring-computational-thinking/
- https://code.org/hourofcode/overview
- https://developers.google.com/blockly

IPB110A: Religions – Islamic Studies

A. Module Identity

1	Course Name	Islamic Studies
2	Course Code	IPB110A
3	Credit	3 (2-1)
4	Semester	1
5	Pre-requisite	-
6	Coordinator	Dr. Hamzah
7	Lecturers	Dr. Neneng Hasanah Dr. Asep Nurhalim Dr. Furqon Syarief H. Musthofa, M.Pd.I. Ahmad Solih, M.E.I. Ahmad Syahirul Alim, M.Pd.I. Wachid Ramadhan, MA.

		M. Anhar Nasution, M.E.I. Qoriatul Hasanah, MRIK
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
3	4.5	28	42					

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 1 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To explain the importance of Islamic education and apply proper etiquette in the pursuit of knowledge.
2. To comprehensively explain Islamic teachings in the fields of Aqidah (creed), Sharia, Akhlaq (ethics), and Da'wah (preaching), and correct misunderstandings about these teachings.
3. To explain the concept of knowledge in Islam and eliminate the dichotomous attitude that contrasts science and Islam.
4. To explain the relationship between humans and religion in Islam, recognize the truth of Islam while being tolerant toward other religions.
5. To demonstrate honesty, discipline, responsibility, and an anti-corruption stance.
6. To read the Quran proficiently and engage in regular worship while carrying out various activities in accordance with Islamic principles.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
A.	Lecture		
1.	Students will be able to explain and apply the etiquette of seeking knowledge	Lecture, Class Discussion	Attitude in class
2.	Students will be able to: a. explain the concept of science in Islam and	Lecture, Class Discussion	

	overcome the dichotomous view that contrasts science and religion. b. demonstrate honesty, discipline, and enthusiasm in developing knowledge based on the teachings of the Quran.		
3.	Students will be able to explain the contributions of Muslim scientists and the role of Muslims in the development of science.	Blended Learning	
4.	Students will be able to explain the relationship between humans and religion in Islam, recognize the truth of Islam, and uphold respect for other religions (demonstrating religious tolerance).	Lecture, Class Discussion	
5.	Students will be able to comprehensively explain Islamic teachings in the field of Aqidah (creed) and to correct misunderstandings about Islamic teachings in Aqidah.	Lecture, Class Discussion	
6.	Students will be able to comprehensively explain Islamic teachings in the field of Sharia and to correct misunderstandings about Islamic teachings in Sharia.	Lecture, Class Discussion	
7.	Students will be able to comprehensively explain Islamic teachings in the fields of ethics (Akhlaq) and preaching (Dawah) and to correct misunderstandings about Islamic teachings in these areas.	Blended Learning	
B.	Practicum		
1.	Students will be able to explain the importance of Islamic education and apply proper etiquette in the pursuit of knowledge.	Lecture, Group Discussion	
2.	Students will be able to: a. read the Quran proficiently, engage regularly in worship, and carry out various activities in accordance with Islamic principles. b. explain the concept of knowledge in Islam and	Lecture, Group Discussion	Group Discussion, Assignment

	overcome the dichotomous attitude that contrasts science and Islam.		
3.	Students will be able to: a. read the Quran proficiently, engage regularly in worship, and carry out various activities in accordance with Islamic principles. b. explain the concept of knowledge in Islam and overcome the dichotomous attitude that contrasts science and Islam. c. demonstrate honesty, discipline, and enthusiasm in developing knowledge based on the Quran.	Lecture, Group Discussion	Group Discussion, Assignment
4.	Students will be able to: a. read the Quran proficiently, engage in regular worship, and carry out various activities in accordance with Islamic principles. b. explain the relationship between humans and religion in Islam, recognize the truth of Islam while respecting other religions (demonstrating religious tolerance).	Lecture, Group Discussion	Group Discussion, Assignment
5.	Students will be able to: a. read the Quran proficiently, engage in regular worship, and carry out various activities in accordance with Islamic principles. b. comprehensively explain Islamic teachings in the field of Aqidah (creed) and correct misunderstandings about	Lecture, Group Discussion	Group Discussion, Assignment

	Islamic teachings in this area.		
6.	Students will be able to: a. read the Quran proficiently, engage in regular worship, and carry out various activities in accordance with Islamic principles. b. comprehensively explain Islamic teachings in the field of Sharia and correct misunderstandings about Islamic teachings in this area.	Lecture, Group Discussion	Group Discussion, Assignment
7.	Students will be able to: a. read the Quran proficiently, engage in regular worship, and carry out various activities in accordance with Islamic principles. b. comprehensively explain Islamic teachings in the field of ethics (Akhlaq) and correct misunderstandings about Islamic teachings in this area.	Lecture, Group Discussion	Group Discussion, Assignment
8.	Students will be able to: a. read the Quran proficiently, engage in regular worship, and carry out various activities in accordance with Islamic principles. b. comprehensively explain Islamic teachings in the field of Da'wah (preaching) and correct misunderstandings about Islamic teachings in this area.	Lecture, Group Discussion	Group Discussion, Assignment

E. Module contents

Topic	Number of Week(s)	Contact Hours
A. Lecture		
1. Course Contract 2. Introduction to Islamic Education	1	2

a. The Importance of Knowledge in Islam b. Etiquette for Seeking Knowledge and Attending Lectures		
1. The universe as a laboratory for discovering the signs of Allah. 2. An explanation of Ayat Kauniyyah and Qouliyyah and their significance.	1	2
Characteristics of Muslim Scientists	1	2
Humans and Religion: a. Definition of Humans: introduction to the term, characteristics, responsibilities, and roles of humans on Earth. b. Definition of Religion: importance and attitudes of humans toward it, as well as the characteristics of Allah's religion and the significance of tolerance in religious practice. c. Definition of Islam: meaning of Islam and its characteristics.	3	6
Tawheed: Introduction to Aqidah and the Urgency of Correct Belief	1	2
1. **Explanation of Tawheed: Meaning, Significance, Divisions, and Application in Life** 2. **Pillars of Faith:** a. The meaning of "pillars" and "faith," along with an explanation of each pillar, including its meaning, requirements, and wisdom.	2	4
1. **Islamic Sharia:** a. Definition of Sharia, its importance, principles, understanding of *Ikhtilaf* (differences of opinion), and divisions of Sharia. 2. **Definition of Worship:** a. Principles of worship, its divisions, detailed aspects of worship, and underlying wisdom.	2	4
Entrepreneurship in Islam: Understanding the command to seek halal sources of wealth, types of haram assets, and obligations regarding lawful income.	1	2
Leadership in Islam: The role of a leader, obligations and rights, and responsibilities of leadership.	1	2
Agent of Change with Morals and Da'wah	1	2
B. Practicum		
Introduction to Islamic Studies Assistance: Guidelines for assistance, group divisions, and introductions of members and tutors.	1	3
• **Tahsin (Reading Practice) of Surah Al-Fatihah** • **The Quran as the Foundation of Knowledge:** History and miracles of the Quran • **The Concept of Iqra (Surah Al-Alaq, 1-5) in Islam**	1	3

• **Tahsin of Surah An-Naba** • **The Quran as a Source of Multidisciplinary Development** • **Contributions of Islamic Scholars to the Advancement of Science**	1	3
• **Tahsin of Surah An-Naziat** • **Introduction to Humanity:** Roles and duties as servants and the purpose of human creation	1	3
• **Tahsin of Surah "Abasa"** • **Introduction to the Meaning and Nature of Islam**	1	3
• **Tahsin of Surah At-Takwir** • **Explanation of the Comprehensive Approach to Implementing All Islamic Teachings**	1	3
• **Tahsin of Surah Al-Infithar** • **The Urgency of Faith in Life:** The meaning of the term *Tawhid* and its application in beliefs, actions, and words.	1	3
• **Tahsin of Surah Al-Bayyinah** • **Avoiding Shirk and the Phenomenon of Polytheism**	1	3
• **Tahsin of Surah Al-Qadr** • **Characteristics of Believers**	1	3
• **Tahsin of Surah Al-Alaq** • **Performing Wudhu According to the Guidance of the Prophet Muhammad**	1	3
• **Tahsin of Surah Asy-Syarh** • **Prayer Minutes:** Understanding the Urgency and Obligation of Prayer, the Nature of the Prophet's Prayer (Sallallahu Alaihi Wasallam), and Its Practice.	1	3
• **Tahsin of Surah Asy-Syams** • **Economic and Business Practices in Islam**	1	3
• **Tahsin of Surah Al-Fajr** • **Application of Leadership Ethics in Islam**	1	3
• **Tahsin of Surah Al-Ghoshiyah** • **Etiquette for Giving Advice According to Islamic Teachings**	1	3

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination	Week 8	
2.	Final Examination	Week 16	

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1.

IPB1101: Religions – Christian Studies

A. Module Identity

1	Course Name	Christian Studies
2	Course Code	IPB1101
3	Credit	3 (2-1)
4	Semester	1
5	Pre-requisite	-
6	Coordinator	Dr. Ir. Elisa Ganda Togu Manurung, M.S
7	Lecturers	Dr. Ir. Bintang C. H. Simangunsong, MS Dr. Charles P. H. Simanjuntak, M.Si Dr. Ir. Suharno, M.Adev Dr. Djuara P. Lubis, M.S. Prof. Dr. Rilus A. Kinseng, M.A. Prof. Dr. Jonson Lumbangaol, MSi Prof. Dr. Ir. Suria Darma Tarigan, M.Sc. Dr. Ir. James P. Panjaitan, M.Phil. Dr. Ir. Salundik Dohong, M.S. Dr. Ir. Lilik Tri Indriyati, M.Sc. Tri Nanda Citra Bangun, Spi, MSi
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
3	4.5	28	42					

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 1 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To master the principles of Christian faith education, using both faith and reason in a balanced manner.
2. To show their devotion to God Almighty and demonstrate a religious attitude.
3. To uphold human values in fulfilling their responsibilities, guided by religion, morality, and ethics.
4. To contribute to improving the quality of life in society, the nation, and the state, based on the principles of Pancasila.
5. To show their love to the nation, exhibit nationalism, and take responsibility for the state and nation.
6. To respect cultural, religious, and belief diversity, as well as the opinions of others.
7. To work collaboratively and demonstrate social sensitivity and concern for society and the environment.
8. To obey the law and maintain discipline in social and civic life.
9. To internalize academic values, norms, and ethics.
10. To embrace the spirit of independence, perseverance, and entrepreneurship.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to: a. understand and recognize the importance of faith in life and personal development. b. understand and can explain the objectives of Christian Religious Education. c. understand and can articulate the benefits of nurturing Christian faith in the pursuit of knowledge. d. know who God is according to His own declarations through the Word of God in the Bible.	Lecture and Class Discussion	Question and Answer, Quiz, Essay
2.	Students will be able to:	Lecture and Class Discussion	Question and Answer, Quiz, Essay, Case Study

	a. understand their identity as the crown of God's creation. b. understand God's purpose in creating humans, as well as the duties and responsibilities given by God to cultivate and care for the earth and everything in it. c. understand the consequences of breaking God's commandments and the punishment for sinful humanity. d. explain humanity's original position, the fall into sin, and the need for God's help to be freed from sin.		
3.	Students will be able to: a. explain that the salvation promised by God has been fulfilled in Jesus Christ. b. understand that Jesus renews human intellect, behaviour, strength, and calling in life.	Lecture and Class Discussion	Question and Answer, Quiz, Essay, Case Study, Individual Assignment
4.	Students will be able to explain the importance of prayer and its role in everyday life.	Lecture and Class Discussion	Question and Answer, Quiz, Essay, Case Study, Individual Assignment
5.	Students will be able to explain the Bible as a reference for knowing God and as a source of inspiration for daily life practices.	Lecture and Class Discussion	Question and Answer, Quiz, Essay, Case Study, Individual Assignment
6.	Students will be able to explain the nature, history of development, and the duties of the church's calling in the midst of society, the nation, and the state.	Lecture and Class Discussion	Question and Answer, Quiz, Essay, Case Study, Individual Assignment
7.	Students will be able to: a. explain baptism as God's command and as a sign that unites believers with Jesus Christ.	Lecture and Class Discussion	Question and Answer, Quiz, Essay, Individual Assignment

	b. understand the meaning of Holy Communion as both a commemoration of the suffering and death of Christ and a communion with the body and blood of Christ.		
8.	Students will be able to explain and provide an account to others regarding the teachings of the Christian faith.	Lecture and Class Discussion	Question and Answer, Quiz, Essay, Individual Assignment
9.	Students will be able to explain their duties and responsibilities toward the environment, in the fields of science and technology, natural resources, citizenship, social and political matters, professional work, and daily life interactions.	Lecture, Class Discussion, Observation	Question and Answer, Quiz, Essay, Individual Assignment

E. Module contents

Topic	Number of Week(s)	Contact Hours
1. Introduction: Content and Objectives of Christian Studies 2. Knowing God (Allah): a. How to know God b. The attributes of God c. God's nature towards humans d. Living God	1	5
Man and the Integrity of Creation a. The original state of humanity b. The fall of man c. The consequences of sin d. The sinful state of humanity	1	5
Salvation in Jesus Christ a. The need for salvation b. Illustration of the promise of salvation c. The pattern of salvation d. Fulfilment of salvation e. The beauty of salvation f. The fruits of salvation g. New life in Jesus Christ	1	5
Prayer a. What is prayer? b. Why pray?	1	5

c. Attitude in prayer d. Barriers to prayer e. The results of prayer and the role of the Holy Spirit		
Bible a. What is the Bible? b. Canonization of the Bible c. The authority of the Bible d. How does the Bible speak?	1	5
The Church a. The meaning and essence of the church b. Church calling c. The unity of the church d. Head of the church e. Fellowship of churches in Indonesia	1	5
Baptism and Holy Communion a. Holy Communion as God's commandment b. The meaning of holy baptism as a sacrament c. The meaning of holy communion	1	5
Apologetics: Important Christian Teachings of Creation, The Divinity of Jesus, and The Holy Trinity	1	5
Responsibility for the Environment	1	5
Ethics of Youth Relations	1	5
Responsibilities as a Citizen	1	5
Responsibility in a Plural Society	1	5
Responsibility as an Intellectual	1	5
Work Ethics and Christian Integrity.	1	5

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination	Week 7	30%
2.	Final Examination	Week 14	30%
3.	Discussion		40%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. The Bible
2. Christian Education for Higher Education. 2016. Ministry of Research, Technology and Higher Education of the Republic of Indonesia, Directorate of Learning and Student Affairs. Jakarta.

3. Christian Religion Modules.
4. Discussion Modules for Christian Religion Subjects

IPB1102: Religions – Catholic Studies

A. Module Identity

1	Course Name	Catholic Studies
2	Course Code	IPB1102
3	Credit	3 (2-1)
4	Semester	1
5	Pre-requisite	-
6	Coordinator	-
7	Lecturers	RD. Paulus Piter, M. Hum RD. Yohanes Dryanto, Lic,
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 1 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. Master aspects of Catholic faith by applying both faith and reason in a balanced manner.
2. To motivate themselves and be prepared for the challenges of the times.

3. To understand their duties and roles as citizens of both the State and the Church: 100% Catholic, 100% Indonesian.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to: a. understand and recognize the importance of faith in life and overall self-development. b. understand and can explain the objectives of Religious Education in Higher Education. c. understand and can explain the benefits of integrating faith into learning science.	Lecture and Class Discussion	Short response test, essay
2.	Students will be able to: a. understand and can explain the meaning of accepting oneself as they are. b. explain the appropriate attitudes, actions, and behaviours for men and women.	Lecture and Class Discussion	Short response test, essay, Case Study, presentation
3.	Students will be able to recognize the meaning and consequences of being Catholic.	Lecture	Individual Assignment, Essay, Presentation
4.	Students will be able to: a. explain how authority, duties, and responsibilities are distributed within the Church. b. explain their duties as members of the Church.	Lecture, Group Observation, Class Discussion	Case Study, Presentation
5.	Students will be able to explain the distinct characteristics of each form of life within the Catholic Church.	Lecture and Group Discussion	Essay, Case Study
6.	Students will be able to: a. explain general approaches to understanding the Holy Bible.	Lecture and Group Discussion	Essay, Individual Assignment

	b. understand the Holy Bible as a Book of Faith.		
7.	Students will be able to identify the nature, meaning and function of the sacrament.	Lecture	Essay, Individual Assignment
8.	Students will be able to live in community which reflects the characteristic of Church life	Lecture and Observation	Simple Video Project
9.	Students will be able to engage themselves in community life	Lecture, Observation, Class Discussion (Seminar)	Interfaith Visit

E. Module contents

Topic	Number of Week(s)	Contact Hours
Introduction to Catholic Studies	1	5
Boy and Man Vs Girl and Woman	2	10
Becoming a Catholic	1	5
The Church and Her Hierarchy	2	10
Living as A Catholic	1	5
The Bible and Its Problems	2	10
Sacraments in the Church	2	10
Building a community	1	5
Church and Community Services	2	10

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination	Week 7	30%
2.	Final Examination	Week 14	30%
3.	Assessments		25%
4.	Online Learning		15%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. St. Darmawijaya, Pr. 2009. *The Ins and Outs of the Holy Bible*. Canisius.

2. KWI Documentation and Information. 2013. *Documents of the Second Vatican Council*. TORCH.
3. Indonesian Catholic Bishops' Conference. 2018. *Code of Canon Law*. Mardi Yuana Bogor Graphics.
4. Indonesian Catholic Bishops' Conference. 2013. *Compendium of the Catechism of the Catholic Church*. Canisius.

Others:

- Lecture Notes for Catholic Studies

IPB1103: Religions – Hindu Studies

A. Module Identity

1	Course Name	Hindu Studies
2	Course Code	IPB1103
3	Credit	3 (2-1)
4	Semester	1
5	Pre-requisite	-
6	Coordinator	Prof. Dr. I Wayan Mangku
7	Lecturers	Prof. Dr. Ir. I Wayan Mangku, M.Sc. Ir. Ngakan Komang Kutha Ardana, M.Sc.
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
3	4.5	28	42					

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 1 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To discover the function of Hindu religious education and religious arts in building a humanist and aesthetic personality base for humans, building a personality that is a leader, law-abiding, healthy, creative and adaptive.
2. To recognize the role of the history of the development of Hinduism in providing positive learning.
3. To understand the role of Brahma Widya, the role of Vedic studies as holy books and sources of law, the role of Hindu philosophy in developing Sraddha and Bhakti.
4. To internalize moral teachings in building morality for Hindu students, building harmony and awareness of students as social creatures according to Hindu teachings.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to discover the function of Hindu religious education in building a humanist personality base for humans.	Lecture and Class Discussion	Quiz, Mid Term Examination
2.	Students will be able to extract the role of the history of the development of Hinduism in providing positive learning.	Videos, Lecture, Class Discussion	Quiz, Mid Term Examination
3.	Students will be able to extract the role of Vedic studies as holy books and sources of laws	Videos, Lecture, Class Discussion	Mid Term Examination
4.	Students will be able to extract the role of Brahma Widya in building Sraddha and Bhakti.	Videos, Lecture, Class Discussion	Mid Term Examination
5.	Students will be able to discover various ways to achieve religious goals	Lecture and Class Discussion	Mid Term Examination
6.	Students will be able to extract the role of Hindu Philosophy to build Sraddha and Bhakti.	Lecture and Class Discussion	Final Examination
7.	Students will be able to extract moral teachings in building morality for Hindu students	Lecture and Class Discussion	Final Examination
8.	Students will be able to build harmony according to the teachings and implementation of Hinduism	Videos, Lecture and Class Discussion	Final Examination
9.	Students will be able to build students' awareness as social creatures according to Hindu teachings.	Videos, Lecture and Class Discussion	Assignment, Final Examination
10.	Students will be able to discover the Hindu human concept in building a personality that is a leader, law-abiding, healthy, creative and adaptive	Videos, Lecture and Class Discussion	Assignment, Final Examination

E. Module contents

Topic	Number of Week(s)	Contact Hours
Introduction to Hindu Studies	1	5
History of the development of Hinduism in India, the world and Indonesia	1	5
Veda Sruti and Veda Smrti	2	10
Basic of Hindu Belief (Satya, Rta, Diksa, Tapa, Brahma, Yadnya) and Panca Sraddha	2	10
Catur Purusartha, Catur Marga (Yoga) and Dharma Siddhiyartha	1	5
Nyaya, Waisesika, Samkhya, Yoga, Mimamsa and Wedanta Philosophy	2	10
Hindu Ethics	1	5
1. Definition of Yadnya 2. Types of Yadnya 3. Samskara	1	5
Catur Asrama, Hindu Family, Catur Warna and Parisada	1	5
Asta Brata, Sapta Angga, Raja Dharma, and Danda Niti	2	10

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination	Week 7	40%
2.	Final Examination	Week 14	40%
3.	Assignment		10%
4.	Quiz		10%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Directorate General of Learning and Student Affairs (DIKTI). 2016. *Hindu Religious Education for Higher Education*.
2. Sivananda, S. S. 1999. *All About Hinduism*. The Divine Life Trust Society Publication.
3. Wiana, K. 1992. *Prayer According to Hinduism*. Dharma Narada Foundation, Jakarta.

Others:

- Mangku, I. W. 2021. *Lecture Material IPB103 Hindu Religion*. General Competency Education Program, Bogor Agricultural Institute.

IPB1104: Religions – Buddhist Studies

A. Module Identity

1	Course Name	Buddhist Studies
2	Course Code	IPB1104
3	Credit	3 (2-1)
4	Semester	1
5	Pre-requisite	-
6	Coordinator	Ir. Hermawan Wana, M.Si
7	Lecturers	Ir. Hermawan Wana, M.Si
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
3	4.5	28	42					

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 1 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To strengthen the concept of the Almighty God.
2. To describe human nature and inner qualities related to their roles and responsibilities in life.
3. To provide arguments that demonstrate their role as part of society and their ability to actively contribute to its advancement.
4. To compare the application of human-made laws with universal laws.
5. To examine morality to achieve the highest happiness, alongside samādhi and pañña
6. To combine the role of science and Buddhism in everyday life.
7. To abstract cultural concepts in Buddhism.

8. To explain politics in the study of Buddhism.
9. To promote harmony among religious communities in the study of Buddhism (referencing the Ministry of Religion).

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to implement belief in the Almighty God	Lecture and Practicum	Post test, Assignment
2.	Students will be able to explain the history of Buddhism.	Lecture and Practicum	Post test, Assignment
3.	Students will be able to apply the moral values contained in the Tripitaka in their academic and daily activities.	Lecture and Practicum	Post test, Assignment
4.	Students will be able to: a. explain human nature in the Four Noble Truths b. examine human dignity	Lecture and Practicum	Post test, Assignment
5.	Students will be able to explain the concept of universal law in Buddhism.	Lecture and Practicum	Post test, Assignment
6.	Students will be able to: a. play an active role in creating a prosperous and happy society b. Abstract Human Rights and Democracy.	Lecture and Practicum	Post test, Assignment
7.	Students will be able to: a. analyse basic moral concepts (sila) b. analyse the ethics and morals in Buddhism.	Lecture and Practicum	Post test, Assignment
8.	Students will be able to: a. analyse the purity of precepts and thoughts on the Path of Purification in Buddhism. b. do proper meditation.	Lecture and Practicum	Post test, Assignment
9.	Students will be able to create art, culture and human life.	Lecture and Practicum	Post test, Assignment
10.	Students will be able to: a. Reconstruct politics in Buddhist society b. Evaluate the contribution of religion to national and civic life.	Lecture and Practicum	Post test, Assignment
11.	Students will be able to:	Lecture and Practicum	Post test, Assignment

	a. analyse the internal harmony of Buddhists. b. analyse harmony between religious communities and the government		
12.	Students will be able to analyse Buddhist teachings in social life to become well-rounded and virtuous individuals.	Lecture and Practicum	Post test, Assignment

E. Module contents

Topic	Number of Week(s)	Contact Hours
Divine Concept: a. divine philosophy in Buddhism b. current, factual religious issues c. public discourse	1	5
The historical role of Buddhism, both before and after the Buddha's enlightenment, in strengthening the faith (saddha) of Buddhists.	1	5
The role of the sacred scriptures *Vinaya Pitaka, Sutta Pitaka* and *Abhidhamma* in the academic and daily life of Buddhists.	2	10
1. Human conception in Buddhism 2. The purpose of human life in Buddhism 3. Human existence and dignity	1	5
Three General Legal Concept of Buddhism a. The Law of Interdependent Origination b. The Law of Karma c. The Law of *Punarbhava* (Rebirth)	2	10
1. The active role of the Buddhist community in creating a prosperous and happy civil society; 2. Empowerment of Buddhist communities; 3. Human rights and democracy according to Buddhist teachings.	1	5
Values and morals as the foundation of life (The Noble Eightfold Path).	1	5
1. Purity of Precepts and Thoughts on the Path of Purification 2. The Benefits of Meditation in Everyday Life	1	5
1. Science and Buddhist Teachings in Everyday Life 2. The Responsibility of Scientists Toward Nature and the Environment 3. Art and Human Life 4. Local Culture and Buddhism	1	5
1. Government in the *Cakkavati Sihanada Sutta* and the *Kutadanta Sutta* 2. Conditions for the Welfare of the Nation	1	5
1. Religious Moderation 2. Sectarian and Nonsectarian Analysis 3. Plurality and Multiculturalism in Buddhism	1	5

4. Inclusivism in Buddhism 5. Religious Tolerance in the Concept of the Upali Sutta 6. The Kalama Sutta and the Reign of King Ashoka 7. The Human Right to Religion (1945 Constitution)		
1. Expertise and Skills in Practicing the *Sigalovada Sutta* in Daily Life 2. Analysing Family Issues (Marriage) and Obligations as Buddhists and Citizens	1	5

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination		0%
2.	Final Examination		0%
3.	Post Tests		
4.	Assignments		

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Directorate General of Learning and Student Affairs, Ministry of Research, Technology and Higher Education. (2016). Buddhist Education for Higher Education. Jakarta: DIKTI
2. Aryakumara. 2013. Ashoka. Dhammacitta Press
3. Bodhi. 2015. Anguttara Nikaya (Numerical Discourses of the Buddha). Jakarta : Dhamma Citta Press
4. Buddhagosa, Bhadantacariya. 1975. The Path of Purification (Visudhi magga).Kandy Sri Lanka: Buddhist Publication Society.
5. David, Rhys. 1977. Dialgues of The Buddha Vol. I, II, III (Digha Nikaya I, II, III). London: Pali Text Society.
6. David, Rhys. 1989. Kindred Sayings Vol. I, II, III, IV, V (Samyutta Nikaya). Oxford: Pali Text Society
7. Dhammika. 2006. King Asoka's Information Insight. Yogyakarta: Vidyasena Production
8. Hare. 1989. Gradual Sayings Vol. I, II, III, IV, V (Anguttara Nikaya). Oxford: Pali Text Society.
9. Taniputera, Ivan. 2003. Modern Science and Buddhism. Jakarta: Karaniya Publishing Foundation.
10. Mehm Tin Mon. 2013. True Creator Karma. Jakarta: Hadaya Vatthu Foundation
11. Narada. 1998. The Buddha and His Teachings Volumes I & II. Jakarta: Dhammadipa Arama Foundation.
12. Siddhi Butr-Indr. 1979. The Social Philosophy of Buddhism. Bangkok: Mahamangutarajaviyalaya Press

13. Wijaya-Mukti, Krisnanda. 2003. Buddha-Dharma Discourse. Jakarta: Dharma Pembangunan Foundation collaboration with Ekayana Buddhist Center.
14. Wowor, Corneles. 1991. Social Views of Buddhism. Jakarta: Aryasuryacandra
15. Dharmmananda, Sri. 2002. *Buddhist Beliefs*. Translated by Ida Kumiati. Jakarta: Karaniya & Ehipassiko.
16. Walshe, Maurice. 2009. *The Long Discourses of the Buddha (Digha Nikaya)*. Jakarta: Dhamma Citta Press.
17. Ratnapala, Nandasena. 1997. *Buddhist Democratic Political Theory and Practice (An Alternative Democracy for the 21st Century?)*. Colombo: Sarvodaya Vishva Lekha Publication.
18. Nyanatiloka, Mahathera. 1970. *Happy Free Life*. Surabaya: The Light of the Borobudur.
19. Mulyadi, Wahyono. 1995. *History of the Development of Buddhism I*. Directorate General of Hindu Buddhist Community Guidance, Department of Buddhism and Open University.
20. Directorate General of Learning and Student Affairs, Ministry of Research, Technology, and Higher Education. 2016. *Open Tax Awareness Materials for Higher Education*. Jakarta: DIKTI Open Materials on Tax Awareness in Higher Education.

IPB110B: Religions – Confucian Studies

A. Module Identity

1	Course Name	Confucian Studies
2	Course Code	IPB110B
3	Credit	3 (2-1)
4	Semester	1
5	Pre-requisite	-
6	Coordinator	
7	Lecturers	
8	Language	-
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
3	4.5	28	42			28		

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 1 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

**) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To understand the concept of God in the Confucian religion.
2. To explain the purpose of life and after life.
3. To create the essence and urgency of religious values.
4. To explain the nature, dignity and responsibility of humans.
5. To explain the development of Confucian thought in response to the challenges of changing times.
6. To explain educational, socio-cultural, legal and political concepts.
7. To harmonize the concepts of science and technology with economics and the environment.
8. To explain the concept of religion as a source of noble values and morals, as well as the concept of diversity and its contribution to the history of world civilization.
9. To understand the role and function of the younger generation as agents of change (S-6, S-10, KU-2, KU-3, KU-4).
10. To explain the concept of God in Confucianism.
11. To explain the purpose of life and the afterlife
12. To articulate the essence and urgency of religious values
13. To explain the nature, dignity, and responsibility of humans
14. To explain the development of Confucian thought in response to the challenges of changing times

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to understand Divinity and believe in God Almighty.	Lecture and Group Discussion	Question and Answer
2.	Students will be able to understand and uphold the concepts of the Prophet, Prophethood, and Shenming in Ru-Confucianism.	Lecture and Group Discussion	Question and Answer, Group Assignment, Group Presentation
3.	Students will be able to understand the purpose of life and after life	Lecture and Group Discussion	Group Presentation
4.	Students will be able to understand Confucian religion and spiritual values.	Lecture and Class Discussion	Question and Answer
5.	Students will be able to understand the concept of human nature, dignity and responsibility.	Lecture and Group Discussion	Group Assignment, Group Presentation
6.	Students will be able to fulfil responsibilities as a human being.	Practicum and Group Discussion	Test
7.	Students will be able to explain the development of Confucian thought	Lecture, Practicum, Group Discussion	Written Test

	in response to the challenges of changing times.		
8.	Students will be able to apply Confucian teachings in response to the challenges of changing times.	Lecture, Practicum, Group Discussion	Group Presentation
9.	Students will be able to understand educational, socio-cultural, legal and political concepts	Lecture and Group Discussion	Individual Assignment
10.	Students will be able to understand the concepts of science and technology, economics and the environment	Lecture and Group Discussion	Written Test
11.	Students will be able to understand religion as a source of morality.	Lecture, Practicum, Class Discussion	
12.	Students will be able to understand the concept of diversity and its contribution to the history of world civilization.		Written Test
13.	Students will be able to understand the role and function of the younger generation as agents of change.	Lecture	Question and Answer
14.	Students will be able to embrace responsibilities as a generation.	Practicum and Group Discussion	Group Presentation

E. Module contents

Topic	Number of Week(s)	Contact Hours
1. Human Perception About God 2. God in Confucianism	1	5
1. The Firmness of Prophet Kongzi's Faith in God 2. Faith in Confucianism 3. Only God's Goodness is Pleasing 4. Study and Practice 5. Prophets 6. Shenming	1	5
1. The Confucian Religion Originates from the Almighty God 2. Basic Principles of Confucian Learning 3. Understanding Religion 4. Exploring the Purpose of Life and the Afterlife 5. Why is There a Need for a Purpose in Life and the Afterlife? 6. Exploring the Sources of Scripture and Literature on the Purpose of Life and Afterlife 5. Building Arguments About the Dynamics and Challenges of Creating Goals in Life and the Afterlife 6. The Essence and Urgency of Creating Goals in Life and the Afterlife	1	5
1. Confucian Religious Concepts and Spiritual Values 2. Reasons Why Confucian Religion and Spiritual Values Are Needed	1	5

3. Holy Books and Literature as Sources on Confucian Religion and Spiritual Values 4. Dynamics and Challenges of Confucian Spiritual Values 5. Confucian Dynamics and Spiritual Values as Determinants of Character Building in the Republic of Indonesia 6. Challenges to Confucian Religion as a Parameter of National Unity and Integrity 7. Challenges to Confucian Spiritual Values as Determinants of Character-Based National Development in the Republic of Indonesia 8. The Essence and Urgency of Confucian Religion and Spiritual Values		
1. Yin-Yang Philosophy 2. Humans as the Noblest Creatures 3. Basic Human Nature 4. Parenting Patterns and Human Development 5. Freedom of Choice 6. Becoming a Great Person 7. Truth and Life 8. Adhering to the Truth 9. The Nature of Evil 10. God's Grace 11. God	1	5
1. Human Responsibility a. Glorifying Virtue b. Self-Development as a Basic Obligation c. Self-Development d. Lifelong Learning 2. Service to the Country a. Building Awareness of Paying Taxes b. Exploring the Concept and Urgency of Tax as a Citizen's Obligation	1	5
1. Historical, Sociological, and Political Sources Regarding the Origin and Implementation of Confucianism in the Context of Modernity and Indonesianness 2. Arguments About the Dynamics, Challenges, and Implementation of Confucian Teachings in the Context of Modernity and Indonesianness 3. The Essence and Urgency of the Source and Implementation of Confucian Teachings Today and in the Future	1	5
1. Satya and Tepasālara 2. Wise, Loving, and Courageous 3. Devotion and Humility 4. Satya and Trustworthiness 5. Decency and Truth	1	5

6. Pure Heart and Shamelessness		
1. Building a Dignified Social and Cultural Life 2. Building a Just and Civilized Political Life	1	5
1. Confucian Religious Concepts Regarding Science and Technology 2. The Economy and the Environment	1	5
1. Understanding Religion 2. The Function and Purpose of Religion 3. The Original Term for Confucianism 4. Praying to God 5. Religion and Customs 6. Religion to Shape Character 7. The Teachings of Mengzi	1	5
1. Concept of Diversity 2. Historical, Sociological, and Political Sources on Diversity 3. Building an Argument for the Dynamics and Challenges of Diversity 4. The Essence and Urgency of Diversity	1	5
Challenges for the future of the younger generation	1	5
1. The Younger Generation as Agents of Change 2. The Function of Taxes in Development 3. Why Taxes Are Necessary 4. Taxes in Everyday Life 5. Procedures for Fulfilling Tax Obligations 6. Exploring the Concept of Fulfilling Tax Obligations 7. Tax Obligations and Rights 8. Tax Management	1	5

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination	Week 8	20%
2.	Final Examination	Week 16	10%
3.	Assignments (Group Assignments, Individual Assignments, Group Presentations, Writtent Tests, etc)	Week 2	5%
		Week 3	5%
		Week 4	5%
		Week 5	5%
		Week 6	5%
		Week 7	5%
		Week 9	5%
		Week 10	5%
		Week 11	5%
		Week 13	5%
		Week 15	5%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. *Si Shu: The Four Books*. Matakin Solo, 2012.
2. *Procedure for Confucian Religious Ceremonies*. Matakin Solo, 1984.
3. *Wu Jing: The Five Classics*. Matakin Solo, 1984.
4. *Xiao Jing: The Book of Filial Piety*. Matakin Solo, 1984.
5. Nio Joe Lan. 2013. *Chinese Civilization at a Glance*. PT Gramedia Pustaka, Jakarta.
6. Tjhie Tjay Ing Xs. 2010. *Basic Teaching Guide to the Confucian Religion*. Matakin Solo.
7. *Open Tax Awareness Materials for Higher Education*. Tax Education Team of the Directorate General of Taxes, Ministry of Finance of the Republic of Indonesia, 2016.

IPB110E: Civic Education

A. Module Identity

1	Course Name	Civic Education
2	Course Code	IPB110E
3	Credit	1 (1-0)
4	Semester	1
5	Pre-requisite	-
6	Coordinator	Dr. Ir. Didid Diapari, M.Si
7	Lecturers	Dr. Ir. Didid Diapari, M.Si (DDI) Dr. Ir. Parlaungan Adil Rangkuti M.Si (PAR) Etty Eidman, S.H (ETE) Prof. Dr Ir Sedarnawati M.Agr. (SYA) Dr. Ir. Sri Rahayu M.Si (SRY) Dr. Ir. Indah Wijayanti (IND) Ir. Ujang Sehabudin M.Si (UJS) Dra. Siti Rahmawati, M.Pd (SRW)
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit	Contact	Self-study	Other	Total

SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
1	1.5	14						

*) Semester credit unit according to the Indonesian higher educational system
1 credit unit lecture = 1 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

**) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To understand the Four Basic Consensus and the Importance of Awareness of National Defence.
2. To understand the Dynamics of Implementing the 1945 Constitution and Changes in the Constitutional System.
3. To apply the Principles of Democratization, Regional Autonomy, Good Governance, and Anti-Corruption as Efforts to Improve the Self-Image of the Indonesian Nation in Facing Changes in the World Order and Managing National Resources for the Prosperity of the Indonesian Nation-State.
4. To identify Problems Using a National Resilience Conceptual Approach and Increase National Awareness of Various Threats to Uphold the Existence of the Republic of Indonesia.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to: a. Explain the Background and Importance of Citizenship Education, Including Its Scope, Objectives, and Competencies to Be Mastered. b. Explain the Importance of the Character of Defending the Country in Upholding the Republic of Indonesia Towards a Golden Indonesia.	Lecture	Pre-Test
2.	Students will be able to understand the Four Basic Consensus and Explain the Importance of Strengthening the Character of National Defense in	Lecture and Class Discussion	Essay

	Facing Changes in the World Order.		
3.	Students will be able to Identify the Relationship Between the Application of Science and Technology as a Breakthrough and Efforts to Improve the Self-Image of the Indonesian Nation in Facing Changes in the World Order, as Well as the Management of National Resources for the Prosperity of the Indonesian Nation (C4).	Lecture and Class Discussion	
4.	Students will be able to understand and Explain the Constitutional System According to the Contents of the 1945 Constitution of the Republic of Indonesia.	Lecture	Class Discussion
5.	Students will be able to Explain Changes in the Constitutional System and Their Relationship to the Implementation of a Presidential Government System.	Lecture and Class Discussion	Question and Answer
6.	Students will be able to explain the Meaning and Function of Archipelagic Insight in the Implementation of Indonesian National Development.	Lecture and Class Discussion	Question and Answer, Case Study
7.	Students will be able to explain the Meaning and Characteristics of National Resilience, as Well as the Application of the Astagatra Dimensions/Aspects in Aligning Reform Movements and National Development as an Aspirational Leader.	Lecture	Class Discussion
8.	Students will be able to explain the Strategy for Changing the RPJMN in the Era of Digitalization and Anticipating New Normal Conditions.	Lecture	Class Discussion, Essay, Question and Answer, Case Study
9.	Students will be able to Convey Ideas to Contribute and Synergize Proactively to Become Responsive, Adaptive, and Responsible Citizens.	Lecture and Class Discussion	Question and Answer
10.	Students will be able to explain the dynamics of ideal regional development through the	Lecture	Class Discussion

	harmonization of central and regional government relations and the implementation of good governance, while encouraging the realization of leadership with Integrity.		
11.	Students will be able to Explain the Democratic Process in Indonesia and the Development of the Electoral System in Efforts to Create Leaders Who Can Realize the Wishes of the People.	Lecture	Class Discussion, Question and Answer
12.	Students will be able to Identify Problems in All Aspects of Life (Astagatra) and National Alertness.	Lecture and Class Discussion	Question and Answer, Case Study
13.	Students will be able to Implement an Anti-Corruption Character to Uphold the Commitment to Prevent Corruption Practices.	Lecture and Class Discussion	Book review, Post Test

E. Module contents

Topic	Number of Week(s)	Contact Hours
Red and White Forever *This phrase signifies the strong bond between the state and its citizens.* a. Objectives of Civic Education and Lecture Contracts b. Efforts to Build Awareness of the Central Role of the Next Generation of the Indonesian Nation in Realizing a Developed Indonesia.	1	1
Water Flows into Mother Earth's Vortex *This phrase highlights the four basic foundations that serve as the basis for strong ties between citizens to create a developed Indonesian state.* a. History of the growth and struggle of the Indonesian nation b. The four consensuses in building collective consciousness.	1	1
Advancing Indonesia's Science and Technology Towards a Golden Indonesia	1	1

This phrase emphasizes the importance of mastering and applying science and technology, which are essential for development and beneficial for managing national resources to ensure the prosperity of the nation. a. Managing the territory, population and natural resources through mastering and advancement of science and technology		
Order and Role of a Democratic Government Organizational System *This highlights the relationship between organizational structure, government processes, and the outcomes of government performance in line with the people's aspirations for collective well-being.*	1	1
Managing Challenges Creates Victory *This emphasizes the management of the governance system in response to the threats of globalization and the demands of democracy.*	1	1
Cooperation in Uniting Steps *This emphasizes the shared perspective of all national components regarding the management of territories and resources by prioritizing common interests.* a. functions and principles of the Indonesian outlook, along with efforts to strengthen pentahelix cooperation (Government, Academia, Private Sector, Community, and Media).	1	1
Realizing the Aspirations of Happiness for the People and Nation *This highlights the efforts to achieve a fulfilling life for the Indonesian people*. a. Managing the basic capital for development (Trigatra).	1	1
Development in the New Normal Era *This emphasizes the importance of adapting to new demands through community empowerment.* a. Adjustments to the medium-term development strategy.	1	1

Young Generation in the National Development Perspective *This highlights the crucial role of the younger generation in the success of national development.*	1	1
Next Generation Leadership with Integrity *This demonstrates the leadership qualities of the next generation, characterized by honesty, trustworthiness, and responsibility.*	1	1
Smart Work Achieves Progress Together *This highlights the role of the electoral system as a key element of the democratic process that successfully elects intelligent and aspirational leaders.*	1	1
Resilience of the Young Generation to Various Threats *This emphasizes the important role of a strong character in the younger generation when facing various threats.*	1	1
Common Enemy: Corruption *This highlights a collective stance towards preventing and combating corruption.*	2	2

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination	Week 7	40%
2.	Final Examination	Week 14	40%
3.	Assignments		20%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Rangkuti, P.A., 2016, Building Awareness of National Defense, Bogor: (2nd edition) IPB Press.
2. Mahmuzar, 2010, Indonesian Government System: Before and After the Amendment to the 1945 Constitution, Jakarta: Nusa Media.
3. Syakrani, 2009, Implementation of Regional Autonomy from a Good Governance Perspective, Jakarta: Student Library.
4. Citizenship Education for Higher Education, Cet.1, Ministry of Research, Technology and Higher Education
5. Anti-Corruption Education for Higher Education, Nanang T. Puspito, Marcella Elwina (edit) Ministry of Education and Culture: 2011

6. The 1945 Constitution of the Unitary State of the Republic of Indonesia (as amended)
7. Law no. 12 of 2006 on Citizenship of the Republic of Indonesia
8. Law no. 32 of 2004 on Regional Government
9. Law no. 33 of 2004 on Financial Balance
10. Law no. 39 of 1999 on Human Rights
11. Law no. 23 of 2019 on Management of National Resources for National Defense

IPB11OF: English

A. Module Identity

1	Course Name	English
2	Course Code	IPB110F
3	Credit	2 (1– 1)
4	Semester	1
5	Pre-requisite	-
6	Coordinator	-
7	Lecturers	-
8	Language	
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
2	3.0	14	42					

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 1 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To communicate in English.
2. To analyse English discourse and extract content from the discourse.
3. To choose a suitable form of speech (language functions).

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to mention and give examples of the main material discussed in this course.	Lectures and Discussion	Oral Presentation, Video presentation (YouTube)
2.	Students will be able to use verb forms based on the time of an event.	Lectures, Discussion, and Presentation	Oral Presentation
3.	Students will be able to identify subject matter and its supporters in a text.	Lectures, Discussion, and Presentation	Oral Presentation
4.	Students will be able to find the important parts needed in a text.	Lectures, Discussion, and Presentation	Written Test
5.	Students will be able to mention the correlation between sentences and pinpoint words substituted by pronouns.	Lectures, Discussion, and Presentation	Written Assignment, Vocabulary Search
6.	Students will be able to do assignments that cover all the topics discussed in the previous meetings.	Lectures, Question – and – Answer	Written Assignment and Presentation
7.	Students will be able to create sequences of an event and explain them.	Lectures, Discussion, and Presentation	Oral Presentation and Upload presentation in YouTube
8.	Students will be able to group objects based on certain criteria.	Lectures, Discussion, and Presentation	Oral Presentation and Upload presentation in YouTube
9.	Students will be able to convey the similarities and differences between two objects.	Lectures, Discussion, and Presentation	Test, Assignment
10.	Students will be able to describe causes and effects.	Lectures, Discussion, and Presentation	Test, Assignment
11.	Students will be able to use appropriate expressions in conveying, receiving and refuting opinions.	Lectures, Discussion, and Presentation	Oral Test
12.	Students will be able to: • Read/interpret data to answer questions explicitly and implicitly. • Extract connections and relationships from data to form predictions.	Lectures, Discussion, and Presentation	Written Assignment, Presentation

E. Module contents

Topic	Number of Week(s)	Contact Hours
Introduction (Course Contract and Course Outline)	1	4
Verb Tenses	1	4
Main Points, Asking Questions and Asking for Clarification, Vocabularies	1	4
Details of a Text, Building Vocabularies	1	4
Ideas within Sentences and Paragraphs, Understanding References; Unfamiliar Words and Vocabularies	1	4
Reviewing Materials – Part 1	1	4
Describing Steps or Stages in a Process	1	4
Classifying Objects	1	4
Comparing and Contrasting Objects	1	4
Describing Cause and Effect	1	4
Expressing Opinion	1	4
Understanding Graphs	1	4
Reviewing Materials – Part 2	1	4

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid-term examination	Week 7	0%
2.	Final examination	Week 14	0%
4.	Assessment	Week 1	5%
		Week 2	8%
		Week 3	7%
		Week 4	7%
		Week 5	8%
		Week 6	7%
		Week 7	5%
		Week 8	8%
		Week 9	8%
		Week 10	8%
		Week 11	8%
		Week 12	8%
		Week 13	8%
		Week 14	5%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

SEMESTER 2

BIO1102: Basics of Biology

A. Module Identity

1	Course Name	Basics of Biology
2	Course Code	BIO1102
3	Credit	3 (2-1)
4	Semester	2
5	Pre-requisite	-
6	Coordinator	Dr Sri Listiyowati, MSi
7	Lecturers	
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
3	4.5	28		42				

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 1 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To Connect phenomena encountered in life with biology.

2. To Understand the necessity of managing Indonesia's biodiversity and consider it in every decision made to address issues impacting the existence of Indonesia's biodiversity.
3. To Imitate positive attitudes in social life, express their opinions, and respect others' opinions regarding biological knowledge and its application in everyday life.
4. To Develop a sense of love for the country after studying Indonesia's biodiversity and its prospects.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
A.	**Lecture**		
1.	Students will be able to: a. explain why Indonesia is a megabiodiversity country and identify its potential. b. explain the characteristics of living things and the main factors that cause the emergence of diversity among them.	Lecture, Class Discussion	Mid Term Examination, Class Participation
2.	Students will be able to explain the history of life on Earth, beginning with the abiotic conditions of ancient Earth, the origins of life, and several major events in the history of life.	Lecture, Class Discussion	Mid Term Examination, Class Participation, Assignment
3.	Students will be able to: a. explain the structure and properties of membranes in relation to their function in cells. b. provide examples of the application of membrane concepts in appropriate and cutting-edge technology. c. explain the structure and function of each cell organelle and their relationship within the endomembrane system.	Lecture, Class Discussion	Mid Term Examination, Class Participation, Assignment
4.	Students will be able to: a. explain the process of forming primary metabolites and their derivatives in autotrophic organisms, which serve as	Lecture, Class Discussion	Mid Term Examination and Class Participation

	producers for other living organisms. b. apply the concept of solar energy bioconversion to explain the process of photosynthesis. c. explain the relationship between photosynthesis products and the formation of compounds other than carbohydrates.		
5.	Students will be able to: a. Identify several benefits of metabolite compounds used in industry. b. Explain the formation and role of energy in the body. c. Explain the relationship between cellular catabolism processes and the formation of other metabolites. d. Understand the applications of metabolomics.	Lecture, Class Discussion	Mid Term Examination, Class Participation, Assignment
6.	Students will be able to: a. Explain the basic principles of reproduction and the inheritance of traits. b. Understand the application of these basic principles in the development and breeding of plants to increase food productivity, such as the stages involved in producing a new type of rice, the IPB 3S Superior Variety, and providing banana seeds in large, uniform, and rapid quantities for agribusiness based on the concept of cellular reproduction.	Independent study, Brief Lecture, Class Discussion	Mid Term Examination, Class Participation
7.	Students will be able to: a. Master the basic concepts of gene replication, expression, and recombinant DNA technology.	Lecture, Class Discussion	Mid Term Examination, Class Participation

	b. Outline the genetic engineering process involved in the construction of GMO/GM products. c. Explain various genetic engineering techniques. d. Critically assess the ethics and risks associated with genetically modified organisms.		
8.	Students will be able to: • Understand the mechanism of organic material degradation by microbes through their biological functions. • Explain the basic concepts of the biological functions of bacteria, protists, and fungi.	Lecture, Class Discussion	Final Examination, Lab Participation
9.	Students will be able to: a. Explain the diversity of plants that produce useful products. b. Describe the organs/cells involved in the production of bioproducts within the anatomical structure of plants.	Lecture, Class Discussion	Final Examination, Lab Participation
10.	Students will be able to: a. Explain the concept of mimicry in plants and animals. b. Explain the concept of biomimicry and its applications in everyday human life. c. Understand how to manage animal and personal waste. d. Develop new ideas based on biological knowledge related to the digestive systems of organisms.	Lecture, Class Discussion	Final Examination, Class Participation, Assignment
11.	Students will be able to: a. Explain the integration of treatment systems with big data in the 21st century to detect diseases before symptoms appear.	Lecture, Class Discussion	Final Examination, Class Participation

	b. Explain human anatomy and physiology related to the circulatory system and the body's defense mechanisms.		
12.	Students will be able to: a. Explain various types of renewable energy based on biological processes. b. Explain the principles of renewable energy. c. Explain the concept of energy flow and material cycles within ecosystems.	Lecture, Class Discussion	Final Examination, Class Participation, Assignment
13.	Students will be able to explain how to meet human social and economic needs while applying the principles of sustainable development for future generations.	Lecture, Class Discussion	Final Examination, Class Participation
14.	Students will be able to understand the connection between academic life and the professional world.	Lecture and Class Discussion	
B.	**Practicum**		
1.	Students will be able to understand the scope of the practicum material and the components of practicum assessment.	Lecture, Class Discussion	
2.	Students will be able to explain the general characteristics of bacteria, protists, and fungi, and provide examples of organisms from each of these three groups.	Lecture, Class Discussion, Video, Case Study	Quiz, Report
3.	Students will be able to explain the variations in plant cell shapes and identify the substances they contain.	Lecture, Class Discussion	Quiz, Report
4.	Students will be able to explain the characteristics of the plasma membrane, particularly the phospholipid bilayer.	Lecture, Class Discussion, Video	Quiz, Report
5.	Students will be able to identify the potential of biological resources (plants, animals, fungi, microbes, etc.) as tourist attractions and communicate this information through popular scientific media.	Lecture, Case Study	Assignment (Infographic)
6.	Students will be able to understand the effect of light intensity on the rate of photosynthesis and can measure the rate of photosynthesis	Lecture, Class Discussion, Video	Quiz, Report

	in a simple way by assessing the oxygen produced by plants.		
7.	Students will be able to understand the energy conversion process through fermentation reactions and recognize the effects of sugar substrates and temperature on fermentation reactions.	Lecture, Class Discussion, Video	Quiz, Report
8.	Students will be able to explain the process of inheritance of traits in plants using monohybrid and dihybrid experiments and analyze blood types in practical family scenarios.	Lecture, Class Discussion, Video, Case Study	Quiz, Report
9.	Students will be able to understand and are able to isolate DNA, explain gel electrophoresis, and comprehend the principles of PCR.	Lecture, Class Discussion, Video, Case Study	Quiz, Report
10.	Students will be able to explain and identify GMO and non-GMO products.	Lecture, Discussion, Video, Case Study	Quiz, Report
11.	Students will be able to explain innovations inspired by nature.	Lecture, Discussion, Video, Case Study	Quiz, Report
12.	Students will be able to explain which plants can play a role in phytoremediation.	Lecture, Discussion, Video, Case Study	Quiz, Report
13.	Students will be able to explain the differences in blood cells at various taxonomic levels and understand genetic disorders through blood tests.	Lecture, Discussion, Video, Case Study	Quiz, Report
14.	Students will be able to understand all the material presented in the practicum.		Test

E. Module contents

Topic	Number of Week(s)	Contact Hours
A. Lecture		
Megabiodiversity: God's Gift for Indonesia: a. Scope of biological studies b. How to study life c. Diversity of living organisms	**1**	**2**
Episodes of Life on Earth: a. The Mystery of the Origin of Life b. The Origin of Prokaryotic, Eukaryotic, and Multicellular Organisms and the Colonization of Land c. Several Major Events in the History of Life	**1**	**2**

Membrane Magic: a. Applied Examples of o Salted Fish Preservation b. Nanoparticles in Drug Delivery Systems c. Basic Membrane Theory: o Divides Cells and Organelles o Specific Structures and Sites o Mobile Transport Regulator o Mediator of Communication Between Cells d. Cell Organelles	**1**	**2**
Bioprospecting Bioconversion of Solar Energy: a. Definition of Solar Energy Bioconversion b. Solar Energy Bioconversion Processes: Dark and Light Reactions c. Formation of Carbohydrate, Protein, and Lipid Compounds in Plants d. Utilization of Metabolic Products by Other Organisms e. Examples of Efforts to Increase Photosynthesis Output	1	2
Bioprospecting: Cellular Catabolism a. Mechanism of ATP Synthesis b. Aerobic Respiration c. Anaerobic Respiration d. Fermentation e. Use of Intermediate Compounds in Industry f. Metabolomics	1	2
Increasing Food Productivity through Reproduction and Inheritance: Concepts and Theories a. The Basis of Asexual Reproduction: Mitosis b. Basics of Sexual Reproduction: Meiosis and Fertilization c. Inheritance of Traits Based on Mendel's Experiments d. Development of Mendelian Genetics and Its Deviations in the Control and Inheritance of Traits e. Example of the Application of the Concept of Reproduction and Inheritance of Traits in Developing the IPB 3S New Superior Rice Variety	1	2
Genetic Engineering: a. Gene Replication and Expression b. Genetic Engineering Techniques: Gene Cloning, Recombinant DNA, Gene/Genome Editing c. DNA Profile Analysis d. Genetically Modified Organisms (GMOs) and Their Products e. Risks of GMOs	1	2
Microbial Diversity and Potential: a. Introduction: Degradation of Organic Material Contaminants (Bioremediation) and Examples of Sources of Organic Material Contaminants	1	2

b. Strategies for Handling Organic Material Contaminants c. Results of Biodegradation d. Biological Functions of Bacterial Microbes, Algae, and Fungi		
Plant Bioproducts a. Historical Background b. Various Plants with Bioproduct Potential c. Benefits of Plant Bioproducts d. Basic Theory: Anatomy of Plant Organs e. Organs/Cells that Produce Bioproducts	1	2
Organism-Based Innovation: a. Mimicry b. Biomimicry c. How Fauna and Flora Inspire Forms of Bioinnovation d. Bioinnovation of Biomaterials	1	2
Molecular Diagnostics and Body Immunity: a. Examples of Molecular Detection Before Disease Symptoms Appear b. Current Common Treatments c. The Role of Big Data in the Future of Medicine d. The Molecular Transportation System in the Animal Body e. The Human Body Defense System	1	2
Renewable Energy Sources: a. Energy for Transportation (Electric Cars and Biofuels) b. Energy from Biomass c. Basic Concepts of Energy Flow and Matter Cycles	1	2
Biodiversity Conservation: a. Global Warming b. International Trade and Threats to Biodiversity c. Conservation Biology d. Restoration Ecology	1	2
Sharing Session with Experts	1	2
B. Practicum		
Practicum Induction	1	3
Microscopic Organism a. **Bacteria** b. **Protista** c. **Fungus**	1	3
Plant Cells a. Plant Epidermis b. Plant Cell Contents	1	3
Cell Membrane Permeability: Characteristics of the plasma membrane	1	3
Biological resources: Plant, animal, fungal, microbial	1	3
The Conversion of Light Energy into Chemical Energy: The Photosynthesis Process	1	3
Energy Conversion through Fermentation	1	3

Inheritance of Traits: **Inheritance of Traits in the ABO Blood Group System and Plants**	1	3
1. **DNA Isolation** 2. **Gel Electrophoresis** 3. **Polymerase Chain Reaction**	1	3
1. **Genetically Modified Organisms (GMO) Products** 2. **Non-GMO Products**	1	3
Biomimicry: a. Biomimicry inspired by animals b. Plant-inspired biomimicry	1	3
Phytoremediation	1	3
Blood cells: a. Red blood cells b. White blood cells c. Genetic disorders	1	3

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination	Week 7	26.12%
2.	Final Examination	Week 14	24%
3.	Class Participation	Week 1 – Week 14	3.2%
4.	Assignment	Week 2	1.25%
		Week 3	1.25%
		Week 5	1.25% + 7% (Infographic)
		Week 10	1.25%
		Week 12	1.25%
5.	Quiz	Week 2	0.28%
		Week 3	0.28%
		Week 4	0.28%
		Week 6	0.28%
		Week 7	0.28%
		Week 8	0.28%
		Week 9	0.28%
		Week 10	0.28%
		Week 11	0.28%
		Week 12	0.28%
		Week 13	0.28%
6.	Test	Week 14	10%
7.	Report	Week 2	2%
		Week 3	2%
		Week 4	2%
		Week 6	2%

		Week 7	2%
		Week 8	2%
		Week 9	2%
		Week 10	2%
		Week 11	2%
		Week 12	2%
		Week 13	2%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Taylor et al. 2017. Campbell Biology: Concepts and Connections 9th. New York: Pearson

FIS1104: Physics for Science and Technology

A. Module Identity

1	Course Name	Physics for Science and Technology
2	Course Code	FIS1104
3	Credit	2 (2 – 0)
4	Semester	2
5	Pre-requisite	-
6	Coordinator	Dr. Ir. Irmansyah, MSi
7	Lecturers	1. Prof. Dr. Ir. Irzaman, M.Si 2. Prof. Dr Tony Ibnu Sumaryada S.Si MSi 3. Prof. Dr. Akhiruddin, S.Si M.Si 4. Dr. Mersi Kurniati, S.Si M.Si 5. Dr. Agus Kartono S.Si M.Si **6. Dr. Ir. Irmansyah, M.Si (coordinator mk)** Dr. Hendradi Hardienata, S.Si M.Si
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
2								

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To understand and associate social phenomena with physics.
2. To analyse social phenomena using concepts of physics including mechanics, thermodynamics, electricity – magnetism, and modern physics.
3. To express opinions and respect the opinions of others.
4. To increase collaboration through group work.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to: • Understand the history of physics and explain the important role of physics in the development of human civilization, and its contribution towards Industrial Revolution 1.0 to 5.0. • Explains the scope of physics, from quarks to the Universe. • Analyse the impact of technology and see opportunities in developing and the use of technologies for the welfare of humanity.	Face to face lecture, Videos, Class discussion, Quiz, Assignments	
2.	Students will be able to: • Understand concepts of speed (rate of change) and its application in everyday life, particularly	Face to face lecture, Videos, Class discussion, Quiz, Assignments	

	in social and economic fields. • Analyse natural and social phenomena and relate them to the concept of motion. • Understand the rapid changes in the world and adapt to technological evolution.		
3.	Students will be able to: • Understand the concept of force, its interaction and application in everyday life, particularly in social and economic fields. • Analyse economic and social dynamics using concepts of forces.	Face to face lecture, Videos, Class discussion, Quiz, Assignments	
4.	Students will be able to: • Explain the concept of vibration and its application. • Explain the concept of waves and wave phenomena in the Universe. • Explain the concept of sounds (intensity, resonance) and their application in daily lives.	Face to face lecture, Videos, Class discussion, Quiz, Assignments, Demo (Musical Instrument/Accoustics)	
5.	Students will be able to: • Explain the concepts of pressure (air, hydrostatic), Pascal's and Archimedes' principle, continuity equation and Bernoulli's equation. • Explain fluid concepts and their application in medical (blood flow rate, blood pressure, cupping), technology (ships, airplanes) and others (skydiving, parachuting, land and sea breezes, climate change, tsunamis).	Face to face lecture, Videos, Class discussion, Quiz, Assignments	

	• Explain fluid concepts analogy in various social and economic phenomena.		
6.	Students will be able to: • Understand concepts of temperature, heat, phase transitions, system and environment interactions and thermodynamic processes. • Analyze environmental phenomena influenced by thermal properties as well as human – environment interaction. • Understand the application of thermodynamics in economic and social systems.	Face to face lecture, Videos, Class discussion, Quiz, Assignments	
7.	Students will be able to: • Understand basic electrical concepts such as Ohm's law. • Analyse simple electrical/electronic circuits. • Evaluate potential renewable energy sources in Indonesia.	Face to face lecture, Videos, Class discussion, Quiz, Assignments, Class Demo	
8.	Students will be able to: • Understand the concept of magnetism (magnetic fields and forces, electrical and magnetic interactions, magnetic induction) and applications of magnetism in everyday life. • Analyse and relate everyday magnetic phenomena with social phenomena.	Face to face lecture, Videos, Class discussion, Quiz, Assignments, Class Demo	
9.	Students will be able to: • Understand the concept of electromagnetism, its application in wireless communication and	Face to face lecture, Videos, Class discussion, Quiz, Assignments	

	impact on social and economic aspects. • Analyse the properties of electromagnetic waves and their use in cutting – edge technologies.		
10.	Students can: • Explain the role of quantum physics in civilization. • Explain wave – particle dualism. • Explain Heisenberg's uncertainty principle. • Analyse various simple quantum phenomena.	Face to face lecture, Videos, Class discussion, Quiz, Assignments	
11.	Students can: • Explain the evolution of material science. • Analyse the rise and fall of a civilization from a material science perspective. • Explain the properties of insulators, semiconductors, conductors, and super conductors.	Face to face lecture, Videos, Class discussion, Quiz, Assignments	
12.	Students can: • Understand the general concept of the Universe such as Einstein's theory of relativity. • Explain the concepts of solar system, asteroids, stars, galaxies, black holes, the big bang theory and the expansion of the universe. • Evaluate opportunities of developing space economy.	Face to face lecture, Videos, Class discussion, Quiz, Assignments	
13.	Students can: • Understand concepts of physics in cinematographic works (science fiction or superhero films). • Analyse the used concepts and identify	Face to face lecture, Videos, Class discussion, Quiz, Assignments	

	inconsistencies or errors in its usage.		

E. Module contents

Topic	Number of Week(s)	Contact Hours
The Amazing World of Physics	1	2
The Faster, The Better (Speed and Acceleration, State of Motion, Rectilinear Motion)	1	2
Don't be Afraid to Move Forward (Motion, Forces, Newton's Law of Motion)	1	2
Keep Up the Good Work (Work and Energy, Momentum and Impulse, Conservation of Energy and Conservation of Momentum)	1	2
The Vibrations of Life (Vibrations, Waves, Sound)	1	2
The Flow of Life (Density, Pressure, Pascal's Principle, Bernoulli Equation, Continuity Equation, Viscosity)	1	2
Hot and Cold World (State/Phase Transition, Entropy, Econophysics)	1	2
Light After Dark (Current, Resistance, Voltage, Circuits, DC and AC Current, Sources of Electrical Energy, World Renewable Energy Map)	1	2
Magnets Bring Happiness (Magnetism, Magnetic Fields, Magnetic Forces, Induction)	1	2
Physics Behind WiFi (Electricity and Magnetism Phenomenon, Electric Field, Electromagnetism, Applications of Electromagnetic Waves - WiFi)	1	2
Quantum: Cool and Profitable (Role of Quantum Physics, Quantum Theory, Heisenberg Uncertainty, Wave Function, Application of Quantum Physics)	1	2
The Power of Material Science (History of Material Science, Metamaterials)	1	2
Interstellar (Future Civilization, Rocket Technology, Space Tourism, Space Economy, Space Exploration, Habitable zones and Exoplanets)	1	2
Physics in Cinematography (Quantum Physics, Relativity and Cosmology in Science Fiction)	1	2

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	In class Quiz (Flash card, Mentimeter, Cahoot)		
2.	Online Quiz		
3.	Assignments		
4.	Just in Time Teaching		
5.	Student Open Mic (5 Minutes)		

6.	Mid Term Examination		
7.	Final Examination		
8.	Mid Term and Final Examination Try Outs		
9.	Weekly Assessment Rubric		

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

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MAT1102: Mathematics and Logical Thinking

A. Module Identity

1	Course Name	Mathematics and Logical Thinking
2	Course Code	MAT1102
3	Credit	3 (2 – 1)
4	Semester	2
5	Pre-requisite	-
6	Coordinator	
7	Lecturers	IPB Mathematics Department Lecturer
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
3								

*) Semester credit unit according to the Indonesian higher educational system
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

**) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To analyse, make judgements and draw appropriate conclusions.
2. To communicate, express quantitative evidence, strengthen arguments or goals.
3. To build and train logical thinking (logical thinking ability).

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students can: • Differentiate deductive and inductive reasoning. • Explain modelling and processes involved within.	Short Videos, Lectures, Discussion, Assignments, Quiz	
2.	Students can: • Determine the truth value of a proposition. • Check the validity of an argument using rules of inference. • Explain the use of general/specific quantification in prepositions. • Determine equivalence and negation between quantifications. • Prove the truth value of a proposition using mathematical	Short Videos, Lectures, Discussion, Assignments, Quiz	
3.	Students can: • Explain and use the concepts of multiplication and addition laws. • Use permutation and combinations concept in various problems. • Explain the meaning of a matrix. • Perform operations on matrices.	Short Videos, Lectures, Discussion, Assignments, Quiz	

	• Determine the solution to Linear Equations. • Formulate a problem in Linear Equations and find its solution.		
4.	Students can: • Explain the concept of linear programming. • Formulate a problem using linear programming and find its solution.	Short Videos, Lectures, Discussion, Assignments, Quiz	
5.	Students can: • Explain the meaning of a function. • Explain types of function. • Write problems in the form of a function. • Model a problem in the form of a function.	Short Videos, Lectures, Discussion, Assignments, Quiz	

E. Module contents

Topic	Number of Week(s)	Contact Hours
Introduction to Problem Solving, Deductive & Inductive Reasoning, and Modelling	1	
Logical Thinking (Propositions, Basic Structures, Complex Propositions, Equality of Two Propositions, Quantified Propositions, Arguments and Drawing Conclusions)	4	
Problem solving using combinatorics (Law of Addition & Multiplication, Permutation, Combination)	2	
Linear Models (Matrix, Systems of Linear Equations and Their Applications)	3	
Linear Programming (Basic Concepts and Simple Applications of Linear Programming)	1	
Fuctions (Modelling Concepts with Functions, Linear and Non – Linear Function Models)	3	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid-term examination		30%

2.	Final examination		40%
3.	Assignments and Quiz		20%
4.	Project		10%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Writing Team. 2002/2003. *Introduction to Mathematics*. Department of Mathematics, FMIPA-IPB, Bogor.
2. Stewart, J. 2016. *Calculus*. 8th ed. Cengage Learning, Canada.

STA1111: Statistics and Data Analysis

A. Module Identity

1	Course Name	Statistics and Data Analysis
2	Course Code	STA1111
3	Credit	3(3-0)
4	Semester	2
5	Pre-requisite	-
6	Coordinator	Dr Ir I Made Sumertajaya, M.Si
7	Lecturers	
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

*) Semester credit unit according to the Indonesian higher educational system

1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

**) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To produce, present, and interpret general information from data.
2. To process simple data collection and management to generate valid information.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to explain basic statistical concepts.	Lecture, Class Discussion, Case Study	Online Quiz, Project, Mid Term Examination
2.	Students will be able to present data in the form of tables and graphs, and they can summarize data in terms of both concentration and distribution.	Lecture, Class Discussion, Case Study	Online Quiz, Assignment, Mid Term Examination
3.	Students will be able to explore data related to identifying extreme values, determining data distribution, comparing groups, and analysing relationships between variables.	Lecture, Class Discussion, Case Study	Project, Mid Term Examination
4.	Students will be able to carry out modelling, starting with identifying the strength of the relationship between variables (both categorical and numerical) and progressing to estimating models of linear relationships between those variables.	Lecture, Class Discussion, Case Stud	Mid Term Examination, Assignment, Project
5.	Students will be able to understand techniques for data collection.	Lecture, Class Discussion, Case Study	Final Examination, Quiz, Assignment, Group Project
6.	Students will be able to manage data effectively.	Lecture, Class Discussion, Case Study	Final Examination, Assignment
7.	Students will be able to create visualizations and presenting analysis results appropriately.	Lecture, Class Discussion, Case Study	Project

E. Module contents

Topic	Number of Week(s)	Contact Hours

Introduction to Statistics a. Understanding statistics b. Understanding samples and populations c. Understanding data d. Types of data e. Big Data f. Illustrations of the application of statistics in various fields	**1**	**3**
Data Understanding: Description a. Data presentation in tabular form (one-way and two-way frequency tables) b. Data presentation in graphic form (bar chart, pie chart, stem-and-leaf plot, dot plot, line chart) c. Data Summary (Numerical summaries - measures of central tendency and dispersion)	**2**	**6**
Understanding Data: Explorations a. Quality exploration of data (identifying extreme values) b. Exploration of data distribution patterns c. Exploration of group comparisons d. Exploration of relationships between variables	2	6
1. Modeling: Association and Correlation a. Analysis of the relationship between two categorical variables: two-way frequency tables and measures of association b. Analysis of the relationship between two numerical variables: line chart and correlation measures **2. Modelling: Regression** Simple Linear Regression: Model Formulation, estimating model parameters	2	6
Data Collection Methods (Quantitative Research) a. Observation b. Survey c. Questionnaire d. Sampling Method e. Experimental Methods f. Ethics in Data Collection	2	6
Data Management **a. Working with One Data Table** • Filtering / Subsetting • Data aggregation • Handling anomalies in the data **b. Working with More Than One Data Table** • Merging data	2	6
Visualization and Presentation a. Fundamental Principles of Visualization b. Graphic Component c. Infographic d. Extracting Information	2	6

e. Narrative Story Telling f. Basic Techniques for Effective Presentation		

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Final Examination	Week 16	
2.	Mid Term Examination	Week 8	
3.	Assignment		
4.	Project		

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Agresti A, Franklin C, Kingenberg B. 2018. Statistics: the art and science of learning from data. Pearson – Harlow, England.
2. Anderson DR, Sweeney DJ, Williams TA, Camm JD, Cochran JJ. 2018. Statistics for Bussiness and Economics, 13th ed. Cengage Learning. Boston.
3. Moore DS, McCabe GP, Craig BA. 2014. Introduction to the Practice of Statistics. WH Freeman and Company – New York, USA.

IPB110D: Pancasila Education

A. Module Identity

1	Course Name	Pancasila Education
2	Course Code	IPB110D
3	Credit	1 (1 – 0)
4	Semester	2
5	Pre-requisite	-
6	Coordinator	Prof. Dr. Ir. Sedarnawati Yasni, M.Agr. IPU
7	Lecturers	Prof. Dr. Ir. Sedarnawati Yasni, M.Agr. IPU (SYA) Dr. Ir. Parlaungan Rangkuti (PAR) Etty Eidman, S.H (ETE) Dr. Ir. Didid Diapari, M.Si (DDI) Dr. Ir. Sri Rahayu M.Si (SRY)

		Ir. Ujang Sehabudin M.Si (UJS) Dra. Siti Rahmawati, M.Pd (SRW). Dr. Ir. Indah Wijayanti (IND) Dr. Vita Rumanti Kurniawati, SPi,MT. (VIT) Juang Gema Kartika, SP., M.Si (JGK)
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
2	2.80	28	28	-	-	28	-	84

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To Build self-awareness as the next generation of the Indonesian nation, who carry the mandate and essence of humanity to consistently practice the values of Pancasila. This involves the ability to interpret historical values in efforts to maintain and fulfill Indonesia's independence, through active contributions to national development across various sectors.
2. Understand the position and essence of Pancasila principles, especially within the legal system, in alignment with Indonesia as a state governed by the rule of law.
3. Be proactive in addressing current challenges facing the Indonesian nation, with the ability to resolve national issues based on the demands and developments of the strategic environment.
4. Apply Pancasila values in the mastery and development of science and technology for the advancement of the Indonesian nation.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to understand the criteria for	Lecture, Class Discussion	Pre-Test

	evaluating the implementation of Pancasila Education lectures and the overall lecture topics.		
2.	Students will be able to explain the history of Pancasila thought and its application during the reform era, as well as the essence of exemplary values derived from the struggle for independence	Lecture, Class Discussion, Video	Report
3.	Students will explain the actualization of Pancasila values in the era of globalization and digitalization (C2).	Lecture, Class Discussion	Essay
4.	Students will be able to explain the meaning of Pancasila as a system of philosophy, ethics, and a way of life for the Indonesian nation, as well as provide examples of the application of Principle 1 and Principle 2	Lecture, Class Discussion	-
5.	Students will be able to complete the assigned tasks or case studies.	Problem Based Learning	Assignment/Report
6.	Students will be able to explain the role of Pancasila as a national ideology, its strengths amidst world ideologies, and provide examples of the application of its principles	Lecture, Class Discussion	Question and Answer
7.	Students will be able to explain the meaning of Pancasila as the foundation of the state, its position in the legal system, and provide examples of its application in the fourth principle.	Lecture, Class Discussion	Question and Answer
8.	Students will explain the role of Pancasila as a framework for thinking in national development across the political, economic, socio-cultural, defense, and security fields, and provide examples of the application of the fifth principle.	Lecture, Class Discussion	Question and Answer
9.	Students will be able to present a case study assignment report based on knowledge, skills, and attitudes that align with Pancasila ethics.	Problem Based Learning	Presentation, Report, Question and Answer

10.	Students will be able to commit to their work, showing their communicative, proactive, responsive, adaptive and responsible attitude.	Lecture, Class Discussion	Report

E. Module contents

Topic	Number of Week(s)	Contact Hours
Introduction to Pancasila Education	1	1
Historical Understanding of Pancasila a. History of the Development of Pancasila Thought b. Examples of Exemplary Values from Historical Videos (e.g., General Soedirman's Video)	1	1
Actualization of Pancasila Values in the Era of Globalization and Digitalization – Guest Lecture	1	1
Philosophical Understanding of Pancasila: Pancasila as a System of Philosophy, Ethics, and View of Life of the Indonesian Nation	1	1
Case Study 1, 2, 3: a. Actualizing Pancasila Values in Socio-Cultural Development in the Digital Era b. Democracy as the Enforcement of Civil Society in Indonesia c. Efforts to Establish Noble Pancasila Values During the Pandemic	4	4
Philosophical Understanding of Pancasila: Pancasila as the Ideology of the Indonesian Nation and Its Existence Amidst World Ideologies	1	1
Philosophical Understanding of Pancasila: Pancasila as the Basis of the State and Its Position in the Legislative Order	1	1
Philosophical Understanding of Pancasila: Pancasila as a National Development Paradigm in the Fields of Politics, Economics, Social Culture, Defense and Security, as well as Science, Technology, and Law	1	1

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Guest Lecture Essay	Week 3	20%
2.	Group Project (Case Studies)	Week 12 - 14	
	Discussion		10%
	Report		20%

3.	Group Project (Case Studies) Presentation	Week 12 - 14	25%
4.	Final Examination	Week 16	25%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Abdullah, Rozali, 1984, Pancasila as the Foundation of the State and the Nation's Way of Life, CV. Rajawali, Jakarta.
2. Ali, As'ad Said, 2009, Pancasila State: The Path to National Welfare, Pustaka LP3ES, Jakarta.
3. Anshoriy, HM. Nasruddin, 2008, Failed Nation: Searching for National Identity, LKiS, Yogyakarta.
4. Bakry, Noor Ms., 2010, Pancasila Education, Pustaka Pelajar, Yogyakarta.
5. Kaelan, 2000, Pancasila Education, Paradigma, Yogyakarta.
6. Dodo, Surono and Endah (ed.), 2010, Consistency of Pancasila Values in the 1945 Constitution and Its Implementation, PSP-Press, Yogyakarta.
7. Kaelan, 2012, Epistemological Problems of the Four Pillars of Nation and State, Paradigma, Yogyakarta.
8. Kusuma, A.B., 2004, The Birth of the 1945 Constitution, Publishing Body of the Faculty of Law, University of Indonesia, Jakarta.
9. Latif, Yudi, 2011, Perfect State: Historicity, Rationality, and Actuality of Pancasila, PT Gramedia Pustaka Utama, Jakarta.
10. Nurdin, Encep Syarief, 2002, Basic Concepts of Ideology: Comparison of Major World Ideologies, CV Maulana, Bandung.
11. Rindjin, Ketut, 2012, Pancasila Education for Higher Education, PT. Gramedia Pustaka Utama, Jakarta.
12. Zubair, Achmad Charris, 1990, Ethics Lecture, Rajawali Pers, Jakarta.
13. Joko Siswanto, 2015, Pancasila: Comprehensive Reflection on Pancasila.
14. Pusat Studi Pancasila, 2013, Pancasila as the State Foundation (Pancasila Course by Soekarno).
15. Zaim Uchrowi, 2013, Character of Pancasila, PT. Balai Pustaka (Persero), Jakarta.

Others:

- PEJOEANG: https://youtu.be/uYu6Raflbe4
- Enam Jam di Jogja: https://youtu.be/AQ-wFgLD6iY
- Janur Kuning: https://youtu.be/LaaUlGKp4Zs
- Serangan Fajar https://youtu.be/n3rM6bvdb7I
- Pasukan Berani Mati https://youtu.be/NTXwTUF759E

- Jendral Sudirman https://youtu.be/uEVhuECnWpQ
- Kereta Api Terakhir https://youtu.be/m-Iql9SkIYI
- Perawan di Sektor Selatan https://youtu.be/3ydcX27I1pI
- Tapal Batas Jendral Sudirman https://youtu.be/9v2wcks6_9g
- Merdeka atau Mati Surabaya 1945 https://youtu.be/3KEha73m3Vs
- Cut Nyak Dien https://youtu.be/SAwotI6iGnA
- Sang Pencerah https://youtu.be/iVy5JEbJkDw
- Ketika Bung Karno di Ende https://youtu.be/eP66pvW06vg
- Sang Kiyai https://youtu.be/X0hqoQCY5ks
- Kartini Baru https://youtu.be/JEl44-MAX74
- Kartini (1982): https://youtu.be/D9WaEzcg1IE
- Senja Merah di Magelang https://youtu.be/3DfF-yYHd_0
- Merah Putih Hati yang Merdeka https://youtu.be/TGGldp2vrmI
- Darah Garuda https://youtu.be/eDyJR2RnC8w
- November 1828 Diponegoro https://youtu.be/-WYF6tE4Jl
- Perjyangan Gerilya https://youtu.be/9vAFJYUZ-4I
- Dokumenter Perang 1945 https://youtu.be/01jToAizpfw
- SEOGIJA: https://youtu.be/01jToAizpfw
- Diponegoro https://youtu.be/hat8iQnzuj0

IPB1106: Indonesian Language

A. Module Identity

1	Course Name	Indonesian Language
2	Course Code	IPB1106
3	Credit	2 (1-1)
4	Semester	2
5	Pre-requisite	-
6	Coordinator	Dr. Mukhlas Ansori, M.Si.
7	Lecturers	Dr. Mukhlas Ansori, M.Si. Dr. Defina, S.S., M.Si. Krishandini, S.S., M.Pd. Renny Soelistiyowati, S.S., M.Hum. Drs. Budiyono, M.Pd. Triyanto, S.S., M.Hum. Dadi Muhamad Hasan Basri, S.Pd., M.Sn. Langgeng Prima Anggradinata, S.S., M.Hum. Risa Prayudhi, S.Hum., M.Pd. Lanti Mustika Irtiani Irlan, S.Pd., M.Pd. Dhea Ayuningsih, S.Pd., M.Pd. Rohmah Tri Pamungkas, S.S., M.Hum.
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0%

		b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
2	3.0	28						

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To analyze Indonesian grammar (spelling, sentences, paragraphs, and discourse).
2. To write according to Indonesian grammar (sentences, paragraphs, and discourse).
3. To write papers that are written according to their scientific field.
4. To create presentation media for scientific work.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to identify spelling errors and learn the history of the Indonesian language.	Lecture (1 x50); Case Based Learning; Practical work (1x100)	Quiz, Exercise Questions
2.	Students will be able to recognize the formation of words and terms, their incorrect use, and their implementation in sentences.	Lecture (1 x50); Case Based Learning; Practical work (1x100)	Quiz, Exercise Questions
3.	Students will be able to analyze the structure of simple sentences and compound sentences.	Lecture (1 x50); Case Based Learning; Practical work (1x100)	Quiz, Exercise Questions
4.	Students will be able to analyze effective sentences.	Lecture (1 x50); Case Based Learning; Practical work (1x100)	Quiz, Exercise Questions
5.	Students will be able to: a. analyze paragraphs in scientific works. b. write paragraphs in scientific papers.	Lecture (1 x50); Case Based Learning; Practical work (1x100)	Quiz, Exercise Questions

6.	Students will be able to write narrative and descriptive texts.	Lecture (1 x50); Case Based Learning; Practical work (1x100)	Exercise Questions
7.	Students will be able to choose research topics and themes related to their field of study.	Lecture (1 x50); Case Based Learning; Practical work (1x100)	Exercise Questions
8.	Students will be able to write expository and argumentative texts in scientific works. (CPMK-3).	Lecture (1 x50); Case Based Learning; Practical work (1x100)	Exercise Questions
9.	Students will be able to write citations and syntheses in scientific works based on literature reviews.	Lecture (1 x50); Case Based Learning; Practical work (1x100)	Quiz, Exercise Questions
10.	Students will be able to refer to various references and compile them into a bibliography.	Lecture (1 x50); Case Based Learning; Practical work (1x100)	Assignment (Create a Bibliography)
11.	Students will be able to compile abstracts of scientific works.	Lecture (1 x50); Case Based Learning; Practical work (1x100)	Assignment (Abstract Making)
12.	Students will be able to report research results in scientific papers.	Lecture (1 x50); Case Based Learning; Practical work (1x100)	Assignment (Scientific Paper)
13.	Students will be able to present research orally.	Lecture (1 x50); Case Based Learning; Practical work (1x100)	Assignment (Presentation)
14.	Students will be able to apply language ethics both orally and in writing both in the virtual world and the real world.	Lecture (1 x50); Case Based Learning; Practical work (1x100)	Assignment

E. Module contents

Topic	Number of Week(s)	Contact Hours
History and spelling of Indonesian language	1	
Words and terms	1	
Structure of single and compound sentences	1	
Effective sentences	1	
Paragraphs	1	
Types of narrative and descriptive text	1	
Research topics, research themes, problem formulation	1	
Types of expository and argumentative texts	1	
Citation and synthesis	1	
Bibliography	1	
Abstracts	1	
Scientific work	1	
Oral presentation	1	
Ethics of speech	1	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Semester Examination		20%
2.	Final Examination		30%
3.	Class Participation		10%
4.	Assignment (Project)	Week 10 – Week 13	20%
5.	Task (Exercise Questions)	Week 1 – Week 9	10%
6.	Quiz	Week 1 – Week 5	10%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Defina, Krishandini, Ansori M., Wahyuni, E.S., Soelistiyowati R. 2019. Kiat Menulis dan Presentasi. Bogor: PT Idemedia Pustaka Utama.
2. [BPPB Kemdikbud] Badan Pengembangan dan Pembinaan Bahasa, Kementerian Pendidikan dan Kebudayaan. 2021. Ejaan Yang Disempurnakan, Edisi V. Jakarta (ID): BPPB Kemdikbud.
3. Institut Pertanian Bogor. 2019. Pedoman Penulisan Karya Ilmiah, Edisi ke-4. Bogor (ID): IPB Press.

KPM1131: Sociology

A. Module Identity

1	Course Name	Sociology
2	Course Code	KPM1131
3	Credit	2(2-0)
4	Semester	2
5	Pre-requisite	-
6	Coordinator	Ir. Murdianto, MSi
7	Lecturers	Alfian Helmi Dr SKPm MSi (AHI Anna Fatchia Dr. MSi,SP (AFC) Arif Satria, Prof. Dr, SP, MSi (ASA) Arya Hadi Dharmawan, Prof. Dr, Ir, MSc.Agr (AHD) Bayu Eka Yulian Dr SP MSi (BEY) Djuara P. Lubis, Dr,Ir, MS (DPL)

		Ekawati Sri Wahyuni, Ir, MS, Dr (ESW) Endriatmo Soetarto, Prof, Dr, Drs, MA (AMO) Fredian Tonny Nasdian, Ir, MS (FTN) Hana Indriana, SP, MSi (HIA Heru Purwandari SP MSi (HPN) Iman K. Nawireja, Ir, MSi (IKN Lala M. Kolopaking, Dr, Ir, MS (LMK) Melani Abdul Kadir Sunito, Dr, Ir, M.Sc (MEA) M Sohibuddin, MSi, SAg (MSB) Mukhlas Ansori, Dr. Drs. MSi (MKA) Murdianto, Ir, MSi (MUR) Nuraini W. Prasodjo, Dr, Ir, MS (NWP) Nurmala K. Panjaitan, Dr, Dra, MS, DEA (NKP) Rai Sita SKpm, MSi (RAI) Rajib Gandi, SKPm MSi (RGA) Ratri Virianita, Dr, Dra, MSi (RAV) Rina Mardiana, Dr.rer.nat.SP MSi (RMA) Rilus A. Kinseng, Prof. Dr, Ir, MA (RAK) Saharuddin, Dr, Ir,MS (SAH) Sarwititi A Agung Dr Ir MS (SSA) Sofyan Sjaf, Dr, SPt, MSi (SOF) Zessy Ardinal Barlan, S.KPm, MSi (ZAB)
8	Language	Indonesian
9	Program(s) in which the course is offered	
10	Type of teaching	

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To explain the definition of sociological concepts as reflected in the main points of discussion.
2. To provide examples of social facts based on empirical observations in Indonesia using sociological concepts.
3. To analyze social facts and empirical observations in Indonesia with sociological concepts to identify and solve social problems.
4. To have a curious, critical, and inclusive attitude and care about social justice.

5. To master theoretical concepts in certain areas of knowledge and skills in general, and theoretical concepts in specific areas of knowledge and skills in depth (KKNI for S1).

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to understand and apply the online learning process using the SCL method in sociology lectures.	Student Centered Learning	-
2.	Students will be able to Understand the differences between knowledge and science, the benefits of studying sociology, and using perspectives in sociology to analyze reality and social facts, with the hope that students will be able to carry out cooperative inquiries.	Lecture, Class Discussion, Video, Documentary	Quiz, Case Study
3.	Students will be able to Understand the definition, terms, and principles of social interaction, relationships, and social networks. Use the concepts of interaction processes and social networks to analyze social reality and facts, and guide students to measure social interactions in terms of both frequency and intensity.	Lecture, Class Discussion	Assignment
4.	Students will be able to understand the meaning and dynamics of social structure and use the concept of social structure to map and analyze social reality, building a critical and inclusive attitude.	Lecture, Class Discussion, Video	Assignment
5.	Students will be able to Understand the typology of society and culture, the formulation and elements of culture, and the processes of integration and diversity. Use this knowledge to analyze social realities and facts. Additionally, guide students to identify	Lecture, Class Discussion, Video	Assignment

	symbols among social entities based on ethnicity.		
6.	Students will be able to Understand the concept of social institutions and their characteristics, as well as their classification. Use this knowledge to comprehend social realities and facts at the institutional level. Additionally, guide students to identify institutions using Venn diagram instruments.	Lecture, Class Discussion, Video	Assignment
7.	Students will be able to Understand the concepts, definitions, basics, and classification of groups, as well as group structure and cohesion. Use this knowledge to comprehend group dynamics and social facts. Additionally, guide students to apply the FGD method to explore group dynamics.	Lecture, Class Discussion, Video	Assignment, Quiz
8.	Students will be able to Understand organizational and bureaucratic concepts to analyze social realities and facts, aiming to prevent bureaucratism and form alternative bureaucracies. Additionally, guide students to apply SWOT analysis in examining organizations.	Lecture, Class Discussion, Video	Assignment
9.	Students will be able to analyze social change and development using concepts related to the meaning, function, and formation of social stratification, as well as the processes of social mobility. Additionally, guide students to apply social stratification instruments and the Gini ratio to measure inequality.	Lecture, Class Discussion, Video	Assignment
10.	Students will be able to analyze the process of social change and development using the concepts of power and authority, as well as patterns of power relations, and directing students to apply the	Lecture, Class Discussion, Video	Assignment

	Cessey Index instrument to measure the influence of actors.		
11.	Students will be able to Understand the background, position, and influence of ecological modernization theory and movements, and use them to build ecological initiatives and practices in social change and development. Additionally, direct students to identify the development of adaptation patterns from traditional to modern.	Lecture, Class Discussion, Video	Assignment
12.	Students will be able to Understand the background, position, and influence of ecological modernization theory and movements, and use them to build ecological initiatives and practices in social change and development. Additionally, direct students to identify the development of adaptation patterns from traditional to modern.	Lecture, Class Discussion, Video	Assignment
13.	Students will be able to analyze social change and gender and development theory, and direct development by using concepts to help students identify differences in time allocation between men and women in the family.	Lecture, Class Discussion, Video	Assignment
14.	Students will be able to analyze the process of social change and development that occurs in society, and direct students to design a planned change.	Lecture, Class Discussion, Video	Assignment

E. Module contents

Topic	Number of Week(s)	Contact Hours
Understanding Society Sociologically	1	2
Social Interaction: Building Cooperation and Managing Social Conflict	1	2
Portrait of Society through the Lens of Social Structure	1	2

Diversity and Existence of Indonesian Culture	1	2
Social Institutional Dynamics	1	2
Group Dynamics in a Changing Society	1	2
Bureaucracy and Corruption Prevention	1	2
The Dynamics of Stratification and Social Mobility in Indonesia During the Digital Era	1	2
Power and Authority	1	2
Communication Cultivates Social Relations	1	2
Ecological Crisis and Ecological Modernization	1	2
Gender, Equality and Social Inclusion	1	2
Social Change in the Era of Globalization	1	2

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

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MSL1100: Soils in the Agriculture-Environment Nexus

A. Module Identity

1	Course Name	Soils in the Agriculture-Environment Nexus
2	Course Code	MSL1100
3	Credit	3 (3-0)
4	Semester	2
5	Pre-requisite	
6	Coordinator	Prof. Budi Mulyanto
7	Lecturers	Dr. Darmawan Ir. Wahyu Purwakusuma, MSc. Dr. Iskandar

		Dr. Syaiful Anwar Dr. Rahayu Widyastuti Dr. Bambang H Trisasongko Dr. Dwi Putro Tejo Baskoro Dr. Heru B Pulunggono Dr. Dyah Tj Suryaningtyas Dr. Dyah Retno Panuju Dr. Muhammad Ardiansyah Dr. Suwardi Dr. Lilik Tri Indriyati Dr. Budi Nugroho Dr. Enni Dwi Wahjunie Dr. Yayat Hidayar Ir. Fahrizal Hazra, MSc. Ir. Hermanu Widjaja, MSc. Dr. Sri Malahayati Yusuf Indri Hapsari F, MSi Desi Nadalia, MSi. Putri Oktariani, SP, M.Agr. Dr. Wahyu Iskandar Vely Brian Rosandi, M.PWK
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To understand the concepts of soil, land, landscape, ecosystem, area, territories, and regions.
2. To explain the functions of land for human life from various perspectives.
3. To describe the role of soil-forming factors and the process of soil formation.

4. Able to explain the physical, chemical, and biological properties of both fertile and marginal soils.
5. To explain human activities and their relationship to soil properties (fertile and marginal).
6. To conduct land use planning according to soil properties and characteristics.
7. To monitor soil/land conditions and their utilization.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to describe the general idea of land and its relation to life, flora, fauna, humans and their interconnections.	Lectures, interactive discussions, visual examples	Mid Term Examination
2.	Students will be able to identify the relevance of soil health in relation to agriculture, forestry, animal husbandry, fisheries, agricultural engineering, and socio-economic factors.	Lectures, interactive discussions, examples in everyday life	Mid Term Examination, Quiz
3.	Students will be able to recognize land, its identity and its position in the universe.	Lectures, interactive discussions, visual examples	Mid Term Examination, Quiz
4.	Students will be able to explain soil formation factors and processes.	Lectures, interactive discussions, visual examples	Mid Term Examination, Quiz
5.	Students will be able to define soil characteristics, dynamics of soil characteristics in space and time	Lectures, interactive discussions, visual examples	Mid Term Examination, Quiz
6.	Students will be able to conduct land inventory (acquisition, storage, processing, presentation)	Lectures, interactive discussions, visual examples	Mid Term Examination, Quiz
7.	Students will be able to perform field lectures (in campus field stations) and describe the landscape and profile of land.	Field visit	Short Report
8.	Students will be able to illustrate the function of land and how it supports life through climate and waste.	Lectures, interactive discussions, visual examples	Short Report
9.	Students will be able to describe cycles and matter in the soil (water, energy, elements)	Lectures, interactive discussions, visual examples	Final Examination, Quiz
10.	Students will be able to distinguish biotic environment and production.	Lectures, interactive discussions, visual examples	Final Examination, Quiz

11.	Students will be able explain land as living space, connectivity space, museum/heritage by observing the land and agriculture museum in Bogor	Excursion	Final Examination, Quiz
12.	Students will be able to present their observation in greenhouses, experimental field (and related activities), land use (forests, oil palm – coffee - rubber plantations, rice fields, crops, buildings).	Field Visit	Short Reports
13.	Students will be able to recommend development, improvements, and mitigation measures for impacts on land and areas.	Lectures, interactive discussions, visual examples	Short Reports
14.	Students will be able to present their understanding of planning, optimization and development of land and areas.	Lectures, interactive discussions, visual examples	Final Examination, Quiz

E. Module contents

Topic	Number of Week(s)	Contact Hours

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

Foth H.D. 1990. Fundamentals of Soil Science 8th ed. United State, John Wiley and Sons

SEMESTER 3

MSL1200: Soil and Plant Analysis

A. Module Identity

1	Course Name	Soil and Plant Analysis
2	Course Code	MSL1200
3	Credit	1(0-1)
4	Semester	3
5	Pre-requisite	
6	Coordinator	Dr Lilik Tri Indriati
7	Lecturers	
8	Language	Bahasa Indonesia
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
1	1.5							

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To identify the morphological characteristics of soil in the field and capable of analysing the chemical and physical properties of soil, as well as assessing plant nutrients.
2. To serve as a soil analyst in the laboratory and understand the methods and applications of soil and plant analysis.
3. To create an inventory of the physical and chemical properties of soil.
4. To understand the differences in soil properties based on the results of chemical and physical property analyses.
5. To manage activities within the scope of their work, demonstrating honesty and responsibility, cooperating effectively, being open and loyal, and maintaining high integrity in carrying out tasks related to their activities.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will understand the skills they have acquired	Practicum, Class Discussion	
2.	Students will be skilled in soil sampling and soil preparation.	Practicum, Class Discussion	Assignment
3.	Students will be skilled in determining water content, bulk density, porosity, and the pF curve.	Practicum, Class Discussion	Assignment
4.	Students will be skilled in determining colour, texture, peptization, and flocculation.	Practicum, Class Discussion	Assignment
5.	Students will be skilled in determining the Cation Exchange Capacity (CEC) and Base Saturation (BS) of soil	Practicum, Class Discussion	Assignment
6.	Students will be skilled in taking and preparing plant samples	Practicum, Class Discussion	Assignment
7.	Students will be skilled in determining plant nitrogen levels.	Practicum, Class Discussion	Assignment
8.	Students will be skilled in determining micronutrients (Fe, Mn, Cu, Zn)	Practicum, Class Discussion	Assignment
9.	Students will be skilled in determining available nitrogen.	Practicum, Class Discussion	Assignment
10.	Students will be skilled in determining total nitrogen.	Practicum, Class Discussion	Assignment
11.	Students will be skilled in determining soil organic matter.	Practicum, Class Discussion	Assignment
12.	Students will be skilled in determining available phosphorus and potassium	Practicum, Class Discussion	Assignment
13.	Students will be skilled in determining pH, Al-DD, and lime requirements.	Practicum, Class Discussion	Assignment
14.	Students will be skilled in identifying the morphological properties of soil in the field and capable of conducting soil analysis for both its physical and chemical properties.	Practicum, Class Discussion	Assignment

E. Module contents

Topic	Number of Week(s)	Contact Hours
Introduction	**1**	**3**
Sampling of intact soil, disturbed soil, intact aggregate soil, and soil sample preparation	**1**	**3**
Water Content, Bulk Density, Porosity, and pF Curve	**1**	**3**

Texture, Color, Peptization and Flocculation	**1**	**3**
Cation Exchange Capacity (CEC) and Base Saturation (BS) of Soil: a. Determination of exchangeable bases b. Determination of soil CEC	1	**3**
Collection and Preparation of Plant Samples	1	**3**
Plant Nitrogen Levels	1	**3**
Micro elements (Fe, Mn, Cu, Zn)	1	**3**
Available Nitrogen: Determination of N-ammonium and N-nitrate	1	3
Total nitrogen: Determination of Total Nitrogen	1	3
Soil organic matter: Determination of soil organic matter	1	3
Available Phosphorus and Potassium: a. Determination of available phosphorus b. Determination of available potassium	1	3
pH, Al-dd, and lime requirements	1	3
Field Studies (Latosol): a. Soil morphology in the field (Darmaga) b. Soil profile description c. Discussion	1	3

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination		20%
2.	Final Examination		20%
3.	Class Participation		10%
4.	Project		40&
5.	Quiz		10%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Others:

- Soil Analysis Practical Module

MSL1210: Agro-Eco Geology

A. Module Identity

1	Course Name	Agro-Eco Geology
2	Course Code	MSL1210
3	Credit	3 (2-1)
4	Semester	3
5	Pre-requisite	
6	Coordinator	Dr Iskandar
7	Lecturers	Dr Iskandar Prof. Dr Ir Budi Mulyanto, M.Sc Dr Ir Dyah Tjahyandari, M.Appl.Sc Ir Hermanu Widjaja, M.Sc.Agr Putri Oktariani, S.P., MAgr
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
	4.5							

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To identify and describe the main minerals that make up rocks, and their relationship to the parent material of soil formed through rock weathering, geological time, and geological structures, as well as their influence on soil formation and potential.
2. To explain and assess the natural fertility potential of land based on its geological conditions.
3. To explain and predict soil and land-related problems, as well as propose alternative solutions, based on agrogeological aspects.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
A.	**Lecture**		
1.	Students will be able to explain the meaning of geology, its branches, the relationship between geology and other sciences, and the role of geology in soil science.	Lecture, Class Discussion	Written Test, Assignment
2.	Students will be able to identify the main minerals that make up rocks.	Lecture, Class Discussion	Written Test, Assignment
3.	Students will be able to identify the main rock groups: igneous, sedimentary, and metamorphic rocks.	Lecture, Class Discussion	Written Test, Assignment
4.	Students will be able to explain the theory of plate tectonics and its relationship to geological structures and natural resource potential.	Lecture, Class Discussion	Written Test, Assignment
5.	Students will be able to explain the relationship between soil parent materials formed from rock weathering, geological time, and geological structure, and their influence on soil formation processes and soil potential.	Lecture, Class Discussion	Written Test, Assignment
6.	Students will be able to explain the water that exists on Earth, both on the surface and as groundwater, as well as the landforms created by river flows.	Lecture, Class Discussion	Written Test, Assignment
7.	Students will be able to: a. Explain the geological conditions in Indonesia in general. b. Explain and estimate	Lecture, Class Discussion	Written Test, Assignment
B.	**Practicum**		
1.	Students will be able to explain the basics of crystal systems, minerals, rocks, and geological structures in relation to their application in soil science.	Practicum, Class Discussion	Report
2.	Students will be able to explain crystal axes and crystal systems.	Practicum, Group Discussion	Report
3.	Students will be able to: a. explain how to identify minerals macroscopically.	Practicum, Group Discussion	Report

	b. explain the difference between dark and light minerals.		
4.	Students will be able to: a. explain how to identify rocks macroscopically. b. explain the differences between igneous, sedimentary, and metamorphic rocks.	Practicum, Group Discussion	Report
5.	Students will be able to explain geological structures and interpret geological maps in relation to soil science.	Practicum, Group Discussion	Report

E. Module contents

Topic	Number of Week(s)	Contact Hours
A. Lecture		
Introduction: a. Definition of geology, branches of geology, and the relationship between geology and other sciences b. The role of geology in soil science c. The shape of the Earth and the Earth's crust d. Exogenous vs. endogenous forces	**1**	**2**
Minerals: The Building Blocks of Rocks a. The elements that make up the Earth's crust b. Definition of minerals and crystals c. Crystal systems	**1**	**2**
Minerals: The Building Blocks of Rocks a. Physical Properties of Minerals b. Mineral Systematics	**1**	**2**
Minerals: The Building Blocks of Rocks a. Resistant minerals and easily weathered minerals b. Silicate and non-silicate minerals as the main constituents of rocks	**1**	**2**
Rock: The Building Blocks of the Lithosphere a. Definition of rock b. The process of rock formation and the rock cycle c. Identification and types of igneous rocks	1	2
Rock: The Building Blocks of the Lithosphere a. The Process of Forming Sedimentary Rocks b. Identification and Types of Sedimentary Rocks	1	2
Rock: The Building Blocks of the Lithosphere a. The Process of Forming Metamorphic Rocks b. Identification and Types of Metamorphic Rocks	1	2
Plate Tectonic Theory a. Basic Assumptions b. Divergent, Convergent, and Transform Plate Boundaries	1	2

c. Plate Tectonics and Natural Resources		
Geological Structure and Geological Time a. Folds, Faults, Breaks, and Cracks of Plates b. Batholiths, Laccoliths, and Karst Features c. Geological Formations d. Relative Age, Absolute Age, and Geological Time Scale	1	2
Climate and Soil Destruction a. Mechanical Destruction b. Chemical Destruction	1	2
Climate and Soil Destruction a. Rate of Crushing b. Soil as a Result of Climate Destruction	1	2
Time Movement a. Triggering Factors b. Types of Mass Movement Processes c. Crawling, Subsidence, and Landslides	1	2
Surface Water and Groundwater: a. Hydrological Cycle b. Surface Water: Water Flow and the Impact of River Activity c. Groundwater: Sources, Water Table, Wells	1	2
Regional Geology of Indonesia: a. History of Geological Studies in Indonesia b. Regional Tectonic Framework c. Regional Stratigraphy	1	2
B. Practicum		
Introduction to Practicum (Induction)	1	3
Crystal systems: systems and classes	1	3
Introduction to the Physical Properties of Minerals / Mineral Identification (I): a. Mineral Forms b. Colour and Streak Colour c. Luster	1	3
Introduction to the Physical Properties of Minerals / Mineral Identification (II): a. Hardness b. Cleavage and Fracture	1	3
Introduction to Igneous Rocks: Structure and Texture	1	3
Introduction to Sedimentary Rocks: Structure and Texture	1	3
Introduction to Metamorphic Rocks: Structure and Texture	1	3
Geological Structure: Model Blocks no. 1 to 10	1	3
Geological Structure: Model Blocks no. 11 to 21	1	3
Geological Maps: Symbols, Legends, and Uses	1	3

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination		30%
2.	Final Examination		30%
3.	Quiz (Practicum)	Week 6	10%
		Week 11	10%
4.	Assignment		10%
5.	Class Participation		10%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Darman, H dan F.H. Sidi. 2000. An Outline of the Geology of Indonesia. Indonesian Associstion of Geologist
2. Lutgens, F.K. and E.J. Tarbuck. 2000. Essentials of Geology. 7th ed. Prentice Hall, New Jersey.
3. Levin, H.L. 1986. Contemporary Physical Geology. Saunders College Publishing. p: 1-19
4. Simpson, B. 1983. Rocks and Minerals. Pergamon Press, Oxford.
5. Tarbuck, E.J. dan F.K. Lutgens. 2000. Earth Science. 9th Ed. Prentice Hall, New Jersey.
6. Van Bemmelen, R.W. 1949. The Geology of Indonesia. Vol. IA. Government Printing Office, The Hague

MSL1220: Agro-Eco Soil Chemistry

A. Module Identity

1	Course Name	Agro-Eco Soil Chemistry
2	Course Code	MSL1220
3	Credit	3 (2 – 1)
4	Semester	3
5	Pre-requisite	
6	Coordinator	Arief Hartono
7	Lecturers	Untung Sudadi, Heru Bagus Pulunggono
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To explain fundamental chemical concepts occurring in soil related to plant growth, production, and the management and sustainability of land and environmental resources in an integrated and logical manner, avoiding speculative interpretations.
2. To analyze soil chemical properties and propose alternative solutions to soil chemistry problems.
3. To identify soil and land chemistry issues and provide alternative solutions.
4. To manage tasks within the scope of work, demonstrating honesty, responsibility, cooperation, openness, loyalty, and high integrity in completing duties.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
A.	**Lecture**		
1.	Students will be able to explain the fundamental principles of chemistry.	Lecture, Class Discussion	Mid Term Examination, Quiz
2.	Students will be able to explain the equilibrium and kinetics of soil chemistry.	Lecture, Class Discussion	Mid Term Examination, Quiz
3.	Students will be able to explain the processes of weathering and soil formation.	Lecture, Class Discussion	Mid Term Examination, Quiz
4.	Students will be able to explain the concept of inorganic soil colloids.	Lecture, Class Discussion	Mid Term Examination, Quiz
5.	Students will be able to explain the concept of organic soil colloids.	Lecture, Class Discussion	Mid Term Examination, Quiz
6.	Students will be able to explain cationic, anionic, and molecular exchanges in the soil.	Lecture, Class Discussion	Final Examination, Quiz
7.	Students will be able to explain oxidation and reduction in soil	Lecture, Class Discussion	Final Examination, Quiz
8.	Students will be able to explain soil acidity, alkalinity, and salinity.	Lecture, Class Discussion	Final Examination, Quiz
9.	Students will be able to explain the important ions in soil.	Lecture, Class Discussion	Final Examination, Quiz
10.	Students will be able to explain soil and environmental chemistry.	Lecture, Class Discussion	Final Examination, Quiz
B.	**Practicum**		
1.	Students will be able to explain the practicum material in general and follow the practicum rules.	Lecture, Discussion	
2.	Students will be able to understand and practice making solutions and preparing soil.	Lecture, Practicum, Class Discussion	Mid Term Examination, Quiz, Class Activity, Assignment
3.	Students will be able to understand and explain the theory of phosphate absorption.	Lecture, Practicum, Class Discussion	Mid Term Examination, Quiz, Class Activity, Assignment
4.	Students will be able to understand and explain the absorption of phosphate in various types of soil.	Lecture, Practicum, Class Discussion	Mid Term Examination, Final Examination, Quiz, Class Activity, Assignment
5.	Students will be able to understand and explain how to process phosphate sorption data using the Langmuir equation.	Lecture, Practicum, Class Discussion	Final Examination, Quiz, Class Activity, Assignment
6.	Students will be able to explain and present the results of the phosphate absorption practicum.	Class Discussion	Final Examination, Class Activity
7.	Students will be able to explain theoretically the changes in soil	Lecture, Practicum, Class Discussion	Final Examination, Quiz, Class Activity, Assignment

	pH, Eh, Fe, and Mn under flooded conditions.		
8.	Students will be able to discuss data and present it in reports.	Lecture, Class Discussion	Final Examination, Class Activity

E. Module contents

Topic	Number of Week(s)	Contact Hours
A. Lecture		
Review of Basic Principles of Chemistry a. Atoms and Atomic Structure b. Atomic Mass and Atomic Mass Number c. Atomic Number d. Avogadro's Number e. Atomic Radius f. Valence g. Equivalent Weight h. Basic Units of Chemistry i. Isotopes, Radioactivity, Half-Life, and Carbon Dating	**1**	
Equilibrium and Chemical Kinetics a. Capacity and Intensity b. Equilibrium Constant c. Concentration and Activity d. Ionic Strength, Activity Coefficient, Debye-Hückel Equation e. Transformation of the Equilibrium Constant f. Equilibrium Constants from Thermodynamic Data g. Oxidation-Reduction Equilibrium h. Reaction Rate in Chemical Kinetics i. Chemical Kinetics Equations	**2**	
Weathering and Soil Development a. Processes, chemical reactions, and weathering agents, including dissolution and reprecipitation b. Stability of minerals in the parent material against weathering c. Ionic potential d. Rate of weathering and soil development	**1**	
Soil Inorganic Colloids a. Soil solid, liquid, and gas phases and their interphases b. Soil colloid system c. Soil inorganic components d. Clay silicate minerals and other minerals that comprise inorganic soil colloids e. Surface chemistry, charge sources, and surface area of inorganic colloids f. Positive charge and zero charge point g. Explanation of the oxidation-reduction balance of the electric double layer h. Clay stability, peptization, and flocculation	**2**	

Soil Organic Colloids a. Organic colloids and their role in soil b. Explanation of the composition of organic colloids c. Sources of organic colloid charge d. Electrochemistry and ion exchange e. Formation of organic-inorganic complexes	**1**	
Cationic, Anionic, and Molecular Exchange in Soil a. Types, characteristics, and strength of application b. Isothermal absorption c. Eradication of ions and molecules d. Factors influencing cation absorption e. Cation exchange capacity, absorption saturation, and cation exchangeability f. Factors influencing anion absorption g. Factors that influence molecular absorption h. Equations for cation and anion absorption	**2**	
Oxidation-Reduction in Soil a. Sources and roles of electrons in redox reactions b. Electrode potential c. Elements, compounds, and important redox reactions in soil d. Rice fields	**1**	
Soil Acidity, Alkalinity, and Salinity a. Definitions and roles of soil reactions b. Formulation of soil acidity, alkalinity, and salinity c. Sources of acidity, alkalinity, and soil salinity d. Saline soil and sodic soil e. Measurement of soil pH and salinity f. Neutralization of soil acidity and alkalinity	**2**	
Important Ions in Soil a. Interchangeable cations b. Easily dissolved anions c. Difficult-to-dissolve anions d. Aluminum and transition metals e. Toxic elements f. Redox elements	**1**	
Soil and Environmental Chemistry a. Explain the environment, life, and technology. b. Explain contamination and pollution. c. Explain the factors that influence environmental quality. d. Explain the relationship between soil and pollution. e. Explain the remediation of contaminated soil.	**1**	
B. Practicum		
Practicum Induction: Materials and Rules	**1**	
Solution Preparation and Soil Preparation	**1**	
Phosphate Absorption	**5**	
Changes in soil pH, Eh, Fe, and Mn in flooded conditions	**4**	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination		50%
2.	Final Examination		50%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Tan K. H. 2011. Principles of Soil Chemistry. 4th Ed, New York (US): CRC Press

Others:

- Anwar, S dan U. Sudadi. 2013. Kimia Tanah. Departemen Ilmu Tanah dan Sumberdaya Lahan, Fakultas Pertanian, IPB

MSL1230: Agro-Eco Soil Physics

A. Module Identity

1	Course Name	Agro – Eco Soil Physics
2	Course Code	MSL1230
3	Credit	3(2-1)
4	Semester	3
5	Pre-requisite	
6	Coordinator	Dr. Ir. Latief Mahir Rachman, M.Sc. MBA
7	Lecturers	
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
		2*14*50' = 1400'						

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To explain and determine the values of various basic physical properties of soil and physical processes related to land management and engineering, as well as their implications for plant growth and production, groundwater management, and watersheds (DAS).
2. To recognize and understand the physical properties of soil, along with their influence and implications for soil management and engineering, as well as their relationship to plant growth, production, groundwater management, and river watersheds (DAS).
3. To act as an analyst in identifying problems related to soil physics, agricultural land, and river basins, and providing alternative solutions.
4. To assess the level of fertility and quality of the soil from the physical aspects.
5. To analyse soil physical properties to maintain and improve soil quality in order to manage and sustain the functions of soil and land.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
A.	Lecture		
1.	Students will be able to understand the meaning, scope, and interrelationship of the basic properties and physical processes of soil related to soil management, crop growth and production, hydrology and river basins, and their connection to agricultural engineering	Lecture, Class Discussion	Assignment, Test
2.	Students will be able to understand the components of soil and their relationship to the functions and roles of soil, particularly those related to the physical mass and volume of soil.	Lecture, Class Discussion, Exercises	Assignment, Test
3.	Students will be able to Understand soil colloids, the smallest soil components, along with their characteristics and influence on the chemical and physical properties of soil, as well as their implications in agriculture and environmental fields.	Lecture, Class Discussion	Assignment, Test
4.	Students will be able to Understand the size of soil constituents (minerals), soil separation, soil texture, and soil texture classes, along with their characteristics and implications in agriculture and environmental life.	Lecture, Class Discussion, Examples	Assignment, Test
5.	Students will be able to understand the arrangement of basic soil particles and other components into aggregates and collections of soil aggregates (soil structure), including the types and sizes of structures, the stability of soil aggregates, and their effects and implications in	Lecture, Class Discussion, Examples	Assignment, Test

	agriculture, hydrology, and the environment		
6.	Students will be able to Understand soil porosity, optimal air circulation, and water movement within the soil, as well as the functions, techniques, and timing of soil management	Lecture, Class Discussion, Examples	Assignment, Test
7.	Students will be able to Understand various properties of soil mechanics related to agriculture, particularly soil rheology, soil dynamics, soil tillage, the selection of tillage tools, and the construction of roads and bridges.	Lecture, Class Discussion, Examples	Assignment, Test
8.	Students will be able to Understand soil temperature, the components that influence it, and techniques for measuring soil temperature in relation to plant growth and production.	Lecture, Class Discussion, Examples	Assignment, Test
9.	Students will be able to Understand water loss through evaporation, plant transpiration, and their combination (evapotranspiration), as well as techniques for measuring and monitoring these processes.	Lecture, Class Discussion, Examples	Assignment, Test
10.	Students will be able to Understand the dynamics and evaluation of soil physical quality in relation to plant growth and production.	Lecture, Class Discussion, Examples	Assignment, Test
11.	Students will be able to Understand the movement of groundwater in a saturated state.	Lecture, Class Discussion, Examples	Assignment, Test
12.	Students will be able to Understand the movement of groundwater in unsaturated conditions	Lecture, Class Discussion, Examples	Assignment, Test
13.	Students will be able to Understand the movement of solutes (fertilizers, pesticides, organic substances, inorganic substances, etc.) in the soil and their effects on plant growth, soil health, and environmental conditions.	Lecture, Class Discussion, Examples	Assignment, Test

14.	Students will be able to Understand the classification of groundwater and its benefits for plant growth, as well as its potential in relation to water management.	Lecture, Class Discussion, Examples	Assignment, Test
B.	Practicum		
1.	Students will be able to determine various physical properties of soil and interpret data related to plant growth and production, as well as its relation to agricultural engineering.	Practicum, Class Discussion	Written Test, Assignment
2.	Students will be able to collect soil samples.	Practicum (Field)	Written Test, Assignment
3.	Students will be able to determine the weights of different particle types	Practicum (Laboratory)	Written Test, Assignment
4.	Students will be able to determine bulk density, soil pore size distribution, and the pF curve.	Practicum (Laboratory)	Written Test, Assignment
5.	Students will be able to determine soil permeability.	Practicum (Laboratory)	Written Test, Assignment
6.	Students will be able to determine the value of soil COLE.	Practicum (Laboratory)	Written Test, Assignment
7.	Students will be able to perform pF curve analysis.	Practicum (Laboratory)	Written Test, Assignment
8.	Students will be able to perform water content calibration.	Practicum (Laboratory)	Written Test, Assignment
9.	Students will be able to determine soil aggregate stability.	Practicum (Laboratory)	Written Test, Assignment
10.	Students will be able to determine field water capacity.	Practicum (Laboratory)	Written Test, Assignment
11.	Students will be able to determine soil texture	Practicum (Laboratory)	Written Test, Assignment
12.	Students will be able to determine soil consistency	Practicum (Laboratory)	Written Test, Assignment
13.	Students will be able to determine soil penetration resistance.	Practicum (Laboratory)	Written Test, Assignment
14.	Students will be able to comprehensively interpret soil physical properties data.	Practicum (Laboratory)	Written Test, Assignment

E. Module contents

Topic	Number of Week(s)	Contact Hours

A. Lecture		
Introduction: Problems, prospects, and opportunities related to the field of Soil Physics	1	**2**
Main components of soil: a. Minerals, organic matter, water, air b. Calculations related to mass and volume c. Water and agricultural irrigation needs	1	**2**
Soil colloids: a. Characteristics b. Implications for the chemical and physical properties of the soil c. Cation and Anion Exchange	1	**2**
1. Soil separation 2. Sizes of soil mineral particles (sand, silt, clay) 3. Texture triangle and determination of 13 texture classes 4. Characteristics and implications for the agricultural sector and the environment.	1	**2**
1. Aggregate formation 2. Types of soil structure 3. Sizes of soil structures 4. Stability of soil aggregates 5. Assessment of soil structure and its effects and implications for soil management techniques.	1	**2**
1. Definition of soil aeration and soil drainage 2. Functions, techniques, and timing of land management related to drainage and soil aeration.	1	**2**
Soil rheology: a. Meaning b. Factors that influence the dynamics and changes in soil shape c. Shear strength d. Shear stress e. Consolidation f. Effects on various agricultural activities	1	**2**
1. The effect of soil temperature on plant growth 2. Factors that influence and fluctuate soil temperature 3. How to calculate capacity, diffusivity, and thermal conductivity	1	**2**
Evaporation, Transpiration, and Evapotranspiration a. Definition b. Effects c. Mechanisms d. Influencing factors e. Measurement f. Estimation	1	**2**
1. Factors affecting the quality of soil physical properties and how it affects plant growth, soil quality, and the environment	1	**2**

2. Principles and techniques for assessing soil physical quality		
1. Principles of saturated and unsaturated groundwater movement 2. Formulas for estimating groundwater movement in unsaturated conditions and the influencing factors.	1	**2**
1. Differences in the movement of saturated and unsaturated groundwater 2. Formulas for estimating groundwater movement in an unsaturated state and the influencing factors.	1	**2**
Principles and mechanisms of solute movement in soil, influencing factors, and their implications for plant growth, soil quality, and the environment.	1	**2**
1. Water functions 2. Classical classification of groundwater and groundwater potential 3. Assessment and measurement of groundwater in the soil.	1	**2**
B. Practicum		
Introduction (Practicum Induction)	1	**3**
Soil Sampling: a. Undisturbed Soil Sampling b. Aggregate Soil Sampling c. Disturbed Soil Sampling	1	3
Particle Specific Gravity	1	3
Bulk Density, Soil Pore Size Distribution, and pF Curve: a. Determination of Bulk Density b. Determination of Total Soil Pore Space c. Determination of Soil Moisture Characteristic Curves d. Determination of Available Soil Water Capacity e. Determination of Pore Size Distribution	1	3
Soil Permeability: Determination of Soil Permeability in Saturated Conditions	1	3
Soil COLE Value	1	3
pF Curve Analysis	1	3
Water Content Calibration	1	3
Soil Aggregate Stability: Determination of Soil Aggregate Stability	1	3
Field Water Content: a. Determination of Soil Water Content in the Laboratory Gravimetrically b. Determination of Soil Water Content in the Field using Tensiometer	1	3
Soil Texture Analysis: Determination of Soil Texture using Hygrometer	1	3
Soil Consistency: a. Determination of Flow Limits b. Determination of Sticky Limits c. Determination of Plastic Limits	1	3

d. Determination of Soil Plasticity Index e. Determination of Optimum Water Content for Processing		
Soil Penetration Resistance: Determination of Soil Penetration Resistance with a Pocket Penetrometer	1	3
Data Interpretation and Reports	1	3

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination		15%
2.	Final Examination		15%
3.	Assignment (Practicum)		20%
4.	Project		50%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Baver, L.D., Gardner, W.H., and Gardner, W. R. 1972. Soil Physics. John Wiley & Sons, Inc. New York, London, Sydney, and Toronto.
2. Hanks, R. J. and G.L. Ashcroft. 1986. Applied Soil Physics. Springer Verlag. Berlin, Heidelberg, New york, Tokyo.
3. Hillel, D. 1998. Environmental Soil Physics. Academic Press. San Diego.
4. Hillel, D. 2004. Introduction to Environmental Soil Physics. Elsevier Academic Press. New York
5. Koorevaar, P., G. Menelik, and C. Dirksen. 1983. Elements of Soil Physics. Elsevier. Amsterdam, Oxford, New York, Tokyo.
6. Lal, R. and M.K. Shukla. 2004. Principles of Soil Physics. Marcel Dekker, Inc. New York
7. Jury, W.A., W. R. Gardner and W. H. Gardner. 2001. Soil Physics 5th ed. John Wiley & Sons, Inc. N.Y.
8. Tinker, P. B. dan P.H. Nye. 2000. Solute Movement In The Rhizosphere. Oxford University Press, New York.

MSL1250: Remote Sensing of Soils and Plants

A. Module Identity

1	Course Name	Remote Sensing of Soils and Plants
2	Course Code	MSL1250
3	Credit	3 (2-1)
4	Semester	3
5	Pre-requisite	
6	Coordinator	Dr. Muhammad Ardiansyah
7	Lecturers	Dr. Khursatul Munibah Bambang Hendro Trisasongko, PhD Dr. Wahyu Iskandar
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To explain the understanding and basic concepts of remote sensing, recognize the characteristics of remote sensing data, and process remote sensing data for inventory, monitoring, and land resource management.
2. To conduct surveys to verify the results of remote sensing data processing.
3. To characterize land using remote sensing technology.
4. To distinguish land issues through remote sensing data processing.
5. To manage activities within their scope of work wisely and prudently and demonstrate high integrity in performing their tasks within their scope of activities.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
A.	Lecture		
1.	Students can explain the understanding and basic concepts of remote sensing, recognize the characteristics of remote sensing data, understand remote sensing energy sources and the interaction of energy with the atmosphere and objects.	Lectures, Class Discussions, Practicum, In – class assignment	Written test
2.	Students can explain the aerial photography system, describe aerial photo processing, differentiate between film, filters, and types of aerial photos, and understand photographic scale and resolution.	Lectures/Discussions, Practicum, In – class assignment	Written test, practicum report
3.	Students can explain the geometry of aerial photos, understand projection, relief displacement, and 3D view, and understand the flight planning process.	Lectures/Discussions, Practicum, In – class assignment	Written test, practicum report
4.	students can explain the process of aerial photo interpretation and identify and use interpretation elements for land cover/use.	Lectures/Discussions, Practicum, In – class assignment	Written test, practicum report
5.	Students can explain the understanding and basic concepts of remote sensing, recognize the characteristics of remote sensing data, and understand remote sensing energy sources and the interaction of energy with the atmosphere and objects.	Lectures/Discussions, Practicum, In – class assignment	Written test, practicum report
6.	Students will be able to name operational natural resource satellites, understand the characteristics of satellites and their sensors, and understand their applications for agriculture.	Lectures/Discussions, Practicum, In – class assignment	Written test, practicum report
7.	students can explain satellites and the characteristics of meteorological and thermal remote sensing, thermal radiation and thermal emission, and their applications.	Lectures/Discussions, Practicum, In – class assignment	Written test, practicum report
8.	students will understand the development of radar and the basic theory of microwave remote sensing and be able to explain the resolution and geometry of SLAR/SAR.	Lectures/Discussions, Practicum, In – class assignment	Written test, practicum report

9.	students will learn about the types of space radar, mention the characteristics of radar data produced, and examine their application for land and crop parameterization.	Lectures/Discussions, Practicum, In – class assignment	Written test, practicum report
10.	students will understand the process of digital image processing, digital images, and sources of image geometric errors and be able to correct them.	Lectures/Discussions, Practicum, In – class assignment	Written test, practicum report
11.	students will understand the sources of radiometric image errors, Top of Atmosphere (ToA) reflectance, and surface reflectance; they will also be able to correct radiometric errors.	Lectures/Discussions, Practicum, In – class assignment	Written test, practicum report
12.	students will understand methods of pixel-based image classification, machine learning, object-based classification, test classification results, and their application for mapping land use and crops.	Lectures/Discussions, Practicum, In – class assignment	Written test, practicum report
13.	students can explain RS and GIS data integration, the relationship between RS data/spectral indices and soil biophysical parameters and create biophysical modelling.	Lectures/Discussions, Practicum, In – class assignment	Written test, practicum report

E. Module contents

Topic	Number of Week(s)	Contact Hours
Definition and Basic Concepts of Remote Sensing	**1**	
Photographic Remote Sensing: • Aerial photos and aerial cameras • Black-and-white and colour aerial photos • Essential characteristics of aerial photos	**1**	
Characteristics and Basic Geometry of Aerial Photos: • Projection, Relief Displacement, and 3D View • Flight Planning	**1**	
Aerial Photo Interpretation: • Definition and interpretation process • Interpretation elements • Application of aerial photo interpretation for land use and vegetation	**1**	
DRONE (Unmanned Aerial Vehicle) • Definition of UAV/Drone • Characteristics of Drones	**1**	

• How Drones Work • Applications of Drones for Soil and Plant Parameterization		
Remote Sensing Satellites Natural Resources: • Types and characteristics of low/medium resolution RS • Types and characteristics of high-resolution RS • Applications for mapping land use and crops	**1**	
Meteorological and Thermal Remote Sensing Satellites	**1**	
Microwave Remote Sensing (radar): • Definition and Development • RADAR Technology • Characteristics of Signal Transmission and Radar Reflection • SLAR/SAR Geometry	**1**	
Types of Microwave Remote Sensing and Their Applications: • Space RADAR • Applications of radar for soil and plant parameterization	**1**	
Understanding of Digital Image Processing: Correction of Image Geometric Errors	**1**	
Correction of Radiometric Image Errors: Image Enhancement	**1**	
Pixel-based Image Classification (supervised and unsupervised), Machine Learning, Object-based Image Classification, Assessment of Classification Accuracy, Application for Mapping Land Use and Crops	**2**	
Integration and Biophysical Modeling of Remote Sensing Data for Soil and Plant Parameterization	**1**	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination	Week 8	25%
2.	Final Examination		25%
3.	Assignments/Mini Project		10%
4.	Practicum		30%
5.	Participative Activities		10%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. T.M. Lillesand, R.W. Kiefer, and J. Chipman. 2015. Remote Sensing and Image Interpretation. 7th Edition. John Wiley & Sons, Inc.
2. J.R. Jensen. 1996. Introductory Digital Image Processing: A Remote Sensing Perspektive. Prentice-Hall, Engewood Clifft, NJ.
3. R.S. Dwivedi. 2017. Remote Sensing of Soils. Springer-Verlag GmbH, Germany

MSL1201: Agrarian Cadastre

A. Module Identity

1	Course Name	Agrarian Cadastre
2	Course Code	MSL1201
3	Credit	2 (2-0)
4	Semester	3
5	Pre-requisite	-
6	Coordinator	Prof. Baba Barus
7	Lecturers	Prof. Dr. Ir. Budi Mulyanto, M.Sc Dr. Ir. Dyah R Panuju, M.Si Dr. Setyardi P Mulya, SP. M.Si
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To explain the concepts of agrarian systems and cadastre, as well as their interrelationship.
2. To explain the nation's strategic issues related to agrarian matters and the role of agrarian resources in sustaining life.
3. To understand and explain laws and regulations related to agrarian matters, including spatial planning, forestry, environment, mining, marine and airspace, investment, state assets (BMN), and land administration.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods

1.	Students will be able to explain the history and significance of studying agrarian systems and cadastre, and the relationship between them.	Lecture, Class Discussion	Class Discussion
2.	Students will be able to explain the dimensions and value of agrarian resources.	Lecture, Class Discussion	Class Discussion, Mid Term Examination
3.	Students will be able to explain various national strategic issues related to agrarian affairs.	Lecture, Class Discussion	Class Discussion, Mid Term Examination
4.	Students will be able to explain laws and regulations related to agrarian matters, including spatial planning, forestry, environment, mining, marine and airspace, investment, and state assets (BMN).	Lecture, Class Discussion	Class Discussion, Mid Term Examination
5.	Students will be able to explain national agrarian resources and their role in sustaining life.	Lecture, Class Discussion	Class Discussion, Mid Term Examination
6.	Students will be able to discuss disputes, conflicts, agrarian cases, and agrarian reform.	Lecture, Class Discussion	Class Discussion, Mid Term Examination, Final Examination
7.	Students will be able to explain agrarian resources and their role in sustainable development.	Lecture, Class Discussion, Individual Assignment	Class Discussion, Mid Term Examination, Final Examination
8.	Students will be able to explain land administration, including the cadastre before Law Number 5 of 1960 concerning Agrarian Principles (UUPA), cadastre according to UUPA, subjects of rights, objects of rights, basis of rights, first land registration, certificates of land rights, data maintenance, and transfer of rights.	Lecture, Class Discussion, Assignment	Class Discussion, Final Examination

E. Module contents

Topic	Number of Week(s)	Contact Hours
1. Course Contract **2. Introduction to Agrarian Cadastre**	**1**	**2**
Types of Land Ownership in Indonesia	**1**	**2**
Agrarian Issues in Indonesia	**1**	**2**
The Development of Agrarian Law in Indonesia	**1**	**2**
Land Use Licensing: Assessment of the Economic Value of Agrarian Reform Land	**1**	**2**
The Importance of Agrarian Reform	**1**	**2**
Implementation of Agrarian Reform: Land Consolidation	**1**	**2**
Agrarian Conflict	**1**	**2**

Agrarian Reform	**1**	**2**
Agrarian Dynamics	**1**	**2**
The Role of Cadastre in Spatial and Regional Planning	**1**	**2**
Cadastre for Land Use and Land Administration	**1**	**2**
Land Tenure Rights: Administration and Business.	**1**	**2**
The Role of Information Systems in Cadastre	**1**	**2**

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination	Week 8	40%
2.	Final Examination	Week 15	40%
3.	Assignment/Quiz		20%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

E. Utrecht (1969) Land Reform in Indonesia, Bulletin of Indonesian Economic Studies, 5:3, 71-88, DOI: 10.1080/00074916912331331482

SEMESTER 4

MSL1251: Geomorphology and Landscape Analysis

A. Module Identity

1	Course Name	Geomorphology and Landscape Analysis
2	Course Code	MSL1251
3	Credit	3(2-1)
4	Semester	4
5	Pre-requisite	
6	Coordinator	Dr. Boedi Tjahjono
7	Lecturers	
8	Language	
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
3								

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To understand geomorphology's importance for land resource management application.
2. To classify landforms according to their morphological, morphogenetic, and morphophonological characteristics and become capable landscape analyst.
3. To create geomorphological or landform maps as information on landscape characteristics that can be used for general or specific land and environmental resource analysis.
4. To manage activities within their scope of work, being honest and responsible, cooperative, open, loyal, and possessing high integrity in carrying out tasks within their activities.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will understand the importance of studying geomorphology in land resource management and be able to explain the definition and scope of geomorphology, its historical development, basic geomorphological concepts, and landscape analysis in general.	Lecture, video, class discussion	Pre-test, Post-test, Structured Assignments
2.	Students will understand the importance of studying geomorphology in land resource management and be able to explain the processes of "internal geodynamics" and tectonic structural landforms.	Lecture, video, class discussion	Pre-test, Post-test, Structured Assignments
3.	Students will understand the importance of studying geomorphology in land resource management and explain the processes of "internal geodynamics", volcanic and plutonic structural landforms.	Lecture, video, class discussion	Pre-test, Post-test, Structured Assignments
4.	Students will understand the importance of studying geomorphology in land resource management and explain the processes of "internal geodynamics", volcanic and plutonic structural landforms.	Lecture, video, class discussion	Pre-test, Post-test, Structured Assignments
5.	students will understand the importance of studying geomorphology in land resource management and be able to explain the "external geodynamics" processes such as denudational, lacustrine, and anthropogenic processes	Lecture, video, class discussion	Pre-test, Post-test, Structured Assignments
6.	students will understand the importance of remote sensing data for geomorphological studies.	Lecture, video, class discussion	Pre-test, Post-test, Structured Assignments
7.	Students will understand the importance of quantitative DEM data for geomorphological analysis.	Lecture, video, class discussion	Pre-test, Post-test, Structured Assignments
8.	students will understand the importance of studying	Lecture, video, class discussion	Pre-test, Post-test, Structured Assignments

	geomorphology in land resource management and be able to explain the exogenetic fluvial processes and the formation and development of fluvial landforms.		
9.	Students will understand the importance of studying geomorphology in land resource management and be able to explain the exogenetic marine and aeolian processes and the formation and development of marine and aeolian landforms.	Lecture, video, class discussion	Pre-test, Post-test, Structured Assignments
10.	students will understand the importance of studying geomorphology in land resource management and be able to explain the exogenetic solutional processes and the resulting landforms (karst) and their development.	Lecture, video, class discussion	Pre-test, Post-test, Structured Assignments
11.	Students will understand the importance of studying geomorphology in land resource management and be able to explain the exogenetic biological/organic processes and the resulting landforms and their development.	Lecture, video, class discussion	Pre-test, Post-test, Structured Assignments
12.	Students will understand the importance of studying geomorphology in land resource management and be able to explain the classification of landforms and mapping methods.	Lecture, video, class discussion	Pre-test, Post-test, Structured Assignments
13.	Students will understand the importance of studying geomorphology in land resource management, especially in understanding the importance of geomorphic processes and landforms for natural disaster studies.	Lecture, video, class discussion	Pre-test, Post-test, Structured Assignments
14.	Students will understand the importance of studying geomorphology in land resource management, especially for environmental studies and changes resulting from the disturbance of geosystems.	Lecture, video, class discussion	Pre-test, Post-test, Structured Assignments

E. Module contents

Topic	Number of Week(s)	Contact Hours
Geomorphology: Definition, Concepts, Landforms, and Processes	**1**	
Tectonic Processes and Their Influence on the Formation of Tectonic Structural Landforms	**1**	
Volcanic Processes and Their Influence on Volcanic Landforms and Plutonic Structural Landforms	**1**	
Volcanic Geomorphic Processes and the Resulting Landforms (audiovisual)	**1**	
Denudational, Lacustrine, and Anthropogenic Processes and Associated Landforms	**1**	
Utilization of Remote Sensing Data for Geomorphological Studies	**1**	
Digital Elevation Model (DEM), Geomorphometry, and Terrain Analysis	**1**	
Fluvial Processes and Landforms	**1**	
Exogenetic Processes, including Marine and Aeolian Processes and the resulting Landforms	**1**	
Exogenetic Solutional Processes and Karst Landforms (endokarst and exokarst)	**1**	
Exogenetic Biological Processes and Related Landforms	**1**	
Classification of Landforms and Mapping Methods: RePPROT, LREP, etc.	**1**	
Geomorphic Processes, Landforms, and Landform Parameters for Natural Disaster Studies	**1**	
The Relationship between Landforms and Ecosystems, Ecoregions, and Geosystems, and the Impact of their Changes	**1**	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination		0%
2.	Final Examination		0%
3.	Assessment	Week 1	7%
		Week 2	7%
		Week 3	7%
		Week 4	7%
		Week 5	7%
		Week 6	7%
		Week 7	7%
		Week 8	7%
		Week 9	7%
		Week 10	7%
		Week 11	7%

		Week 12	8%
		Week 13	7%
		Week 14	8%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Desaunettes, J.R. 1977. Catalogue of Landforms for Indonesia. FAO-Soil Research Institute, Bogor, p 111;
2. Hengl T. dan Reuter H.I. 2009. Geomorphometry: Concepts, Software, Application. Oxford: Elsevier, p. 765.
3. Huggett R.J. 2011. Fundamentals of Geomorphology, (3rd ed.). New York: Routledge, p. 516.
4. Thornbury W.D., 1985. Principles of Geomorphology, (2nd ed), John Wiley and Sons, Inc. p 594.

Others:

- Tjahjono, B., B. Barus, K. Munibah, 2014. Geomorfologi dan Analisis Lanskap. Divisi Penginderaan Jauh dan Informasi Spasial, Departemen Ilmu Tanah dan Sumberdaya Lahan, Fakultas Pertanian, Institut Pertanian Bogor;
- Tjahjono, B., B. H. Trisasongko, K. Munibah, 2013. Penuntun Praktikum Geomorfologi dan Analisis Lanskap. Divisi Penginderaan Jauh dan Informasi Spasial, Departemen Ilmu Tanah dan Sumberdaya Lahan, Fakultas Pertanian, Institut Pertanian Bogor.

MSL1240: Agro-Eco Soil Biology

A. Module Identity

1	Course Name	Agro-Eco Soil Biology
2	Course Code	MSL1240
3	Credit	3 (2-1)
4	Semester	4
5	Pre-requisite	
6	Coordinator	Dr. Rahayu Widyastuti
7	Lecturers	
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To understand the significance of soil organisms' influence on soil properties, which ultimately affects plant growth and yield.
2. To analyse soil biological properties and identify biological issues in the soil.
3. To assess biological soil fertility levels, identify soil biological problems, and propose alternative solutions.
4. To manage activities within the scope of their work, demonstrating honesty, responsibility, cooperation, openness, loyalty, and high integrity in carrying out tasks.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
A.	**Lecture**		
1.	Students will be able to understand the importance of soil organisms' influence on soil properties, which ultimately affects plant growth and yield.	Lecture, Video, Class Discussion	Pre – test, Post – test, Assignment
2.	Students will be able to understand the importance of soil organisms on soil properties, which ultimately affects plant growth, and yield.	Lecture, Video, Class Discussion	Pre – test, Post – test, Assignment
B.	**Practicum**		
1.	Students will be able to skilfully determine the number and diversity of soil micro-, meso-, and macro-organisms, and recognize various soil organisms that play an important role in plant growth.	Lecture, Video, Class Discussion	Pre – test, Post – test, Assignment

E. Module contents

Topic	Number of Week(s)	Contact Hours
A. Lecture		
Introduction	**1**	**2**
Basics of Microbiology: a. Aseptic techniques b. Principles of microscopy c. Soil microorganisms	1	2
Heterotrophic and Autotrophic Bacteria: a. Life requirements b. Population and distribution c. Ecology	1	2
Aerobic and Anaerobic Bacteria: a. Life requirements b. Population and distribution c. Ecology	1	2
Fungi and Actinomycetes: a. Life requirements b. Population and distribution c. Ecology	1	2
Endomycorrhiza: a. Basic understanding b. Role c. Population and distribution d. Ecology	1	2
Ectomycorrhiza: a. Basic Understanding b. Role c. Population and distribution d. Ecology	1	2

Algae, Protozoa, and Viruses: a. Life requirements b. Population and distribution c. Ecology	1	2
Earthworms and Termites: a. Ecology of worms and subterranean termites b. Factors affecting worm populations and subterranean termites c. Influence of earthworms and termites on soil properties	1	2
Ants and Other Arthropods: a. Ecology b. Factors that influence population c. Influence of ants and other arthropods on soil properties	1	2
Acari: a. Ecology b. Factors that influence their population c. Influence of Acari on soil properties	1	2
Collembola and Other Important Soil Mesofauna: a. Ecology b. Factors that influence their population c. Influence of Collembola and other soil mesofauna on soil properties	1	2
Carbon, Nitrogen, and Phosphorus Cycle: a. General C, N, and P cycles b. Types of organic material and the decomposition process c. Transformation processes of N, P, and other nutrients d. Role of microbes in nutrient transformation	1	2
Soil Biology Applications in Various Fields: a. Agricultural sector b. Forestry sector c. Fisheries and livestock sectors d. Environmental field	1	2
B. Practicum		
Introduction	1	
Soil Sampling: a. Observation of soil biodiversity in the field b. Determination of field capacity water content	1	
Determination of the Total Number of Microorganisms and Fungi	1	
Preparing Isolates for Observing Bacteria Using a Microscope	1	
Observation of the Cell Morphology of Bacteria, Fungi, and Mycorrhizal Spores	1	
Determination of the Number of Nitrosomonas/Nitrobacter and Algae Using the MPN Method	1	
1. Taking Soil Samples for Soil Fauna Observations	2	

2. Extraction of Soil Fauna Using the Heat Extraction Method		
Determination of Soil Respiration	1	
Observation of Nitrosomonas/Nitrobacter and Algae Using the MPN Method	1	
Observation and Identification of Soil Fauna	1	
Determination of Soil Respiration Yield	1	
Data Processing and Analysis	1	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Alef, K. and P. Nannipieri. 1995. Methods in Applied Soil Microbiology and Biochemistry. Academic Press Harcourt Brace & Company, Publishers. San Diego, USA: 576 pp
2. Alexander, M. 1972. Introduction to Soil Microbiology. John Wiley & Sons, Inc. New York and London: 472 PP
3. Borror, D.J., C.A. Triplehorn and N.F. Johnson. 1989. An Introduction to the study of Insects. Sixth Edition, Saunders college Publishing, New York
4. Iswandi, A. 1989. Biologi Tanah dalam Praktek. PAU Bioteknologi Institut Pertanian Bogor:254 pp
5. Killham, K. 1994. Soil Ecology. Cambridge University Press, Melbourne, Australia: 242 pp
6. Madigan, M.T., Martinko, J.M., Parker, J. 2003. Brock Biology of Microorganisms. 10th Edtion, Pearson Education, Inc. NJ.
7. Satchell, J. E. Earthworm Ecology: From Darwin to Vermiculite. Chapman and Hall. London and new York: 495pp
8. Schinner, F., R. Ohlinger, E. Kandeler and R. Margesin. Methods in Soil Biology. Springer-Verlag Berlin Heidelberg New York:426 pp
9. Sieverding, E. 1991. Vesicular-Arbuscular Mycorrhiza Management in Tropical Ecosystems. GTZ GmBH Eschborn FRG:371 pp

10. Sparks, D. L., A. L. Page, P. A. Helmke, R. H. Loeppert, P. N. Soltanpour, M. A. Tabatabai, C. T. Johnston, and M. E. Summer, 1996. Methods of Soil Analysis Part 2. Microbiology Methods. SSSA Inc., ASA Inc. Madison, Wisconsin, USA:1185
11. van Elsas, J. D. and E. M. H. Wellington. 1997. Modern Soil Microbiology. Marcell Dekker, Inc. New York: 683 pp

Others:

- Verstraete, W.H. 1989. Pratical Note of Soil Microbiology. Laboratory of Microbial Ecology. Faculty of Agricultural Sciences, State University of Ghent, Belgium
- Vincent, J. M. 1970. A Manual for the Practical Study of the Root Nodule Bacteria. Burgess and Sons (Abingdon) Ltd. Berkshire, GB.
- Widyastuti R. 2002. Soil fauna in rainfed paddy field ecosystems: their role in organic matter decomposition and nitrogen mineralization. (Part: Material and Methods). Zentrum fur Entwicklungsforshung (ZEF), University of Bonn.

MSL1320: Soil Fertility

A. Module Identity

1	Course Name	Soil Fertility
2	Course Code	MSL1320
3	Credit	3 (2 – 1)
4	Semester	4
5	Pre-requisite	
6	Coordinator	Suwarno
7	Lecturers	Untung Sudadi, Heru Bagus Pulunggono, Arief Hartono
8	Language	Bahasa Indonesia
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To identify and solve soil fertility and nutrient management problems to support sustainable agriculture.
2. To analyze soil fertility properties inventory.
3. To identify and evaluate soil and land fertility problems and assess the level of soil fertility.
4. To determine the type and dosage of fertilizer, as well as provide alternative solutions to problems in the field of soil fertility.
5. To manage activities within the scope of their work, being honest and responsible, able to cooperate, open, loyal, and have high integrity while carrying out tasks within their activities.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to identify and solve soil fertility and nutrient management problems to support sustainable agriculture.	Lecture, Class Discussion	Written test, Assignment

E. Module contents

Topic	Number of Week(s)	Contact Hours
Competencies and Domains of Soil Fertility and Nutrient Management: a. Subject competencies b. The realm of soil fertility c. The position of soil fertility and nutrient management within soil sciences and agronomy d. The history of the development of soil fertility	**1**	
Relationship Between Soil Forming Factors and Soil Fertility: a. Major nutrient cycles in nature b. The connection between formation and soil development with soil fertility c. Fertility conditions of land in Indonesia	**1**	
Plant Growth and Growth Factors: a. External and internal factors that influence plant growth b. The relationship between variety or production and nutrient requirements c. Interaction between growth factors, nutrients, and production d. Similarities in growth concerning nutrients	**1**	
Nutrients Needed by Plants and Their Role: a. Understanding essential and functional nutrients b. The roles of essential and functional nutrients in plants	**1**	
Basics of Soil-Plant Relationships: a. Soil load b. Ion exchange c. Important chemical properties of nutrients in soil d. Soil solution e. The movement of ions to the roots and the factors that influence it f. Rhizosphere properties and nutrient uptake mechanisms	**1**	
Nitrogen and Soil Organic Matter Management: a. Nitrogen cycle b. Sources of nitrogen in the soil c. Nitrogen fixation d. Forms and transformation of soil nitrogen e. Soil's ability to provide nitrogen f. Loss of nitrogen from the soil g. Availability of nitrogen and how to measure it	**1**	

h. Carbon cycle i. Sources of soil organic matter and nutrient composition j. The role of organic materials in plant growth		
Soil Phosphorus Management: a. Phosphorus cycle b. Sources and content of phosphorus in soil c. Forms and transformation reactions of phosphorus in soil d. Phosphorus retention in the soil e. Availability and methods for measuring phosphorus	**1**	
Potassium, Calcium, and Magnesium in Soil: a. Sources and contents of potassium, calcium, and magnesium in the soil b. Forms and transformation reactions of potassium, calcium, and magnesium in the soil c. Their availability and methods for measuring them	**1**	
Soil Sulphur and Silicate Management: a. Sources and content of sulfur and silicon in the soil b. Forms and transformation reactions of sulfur in the soil c. Forms of silicon in the soil d. Methods for measuring sulfur and silicon in the soil	**1**	
Micronutrient Management in Soil: a. Sources and content of microelements (Fe, Mn, Cu, Zn, B, Mo, Co, Si, Na, Cl, Se) b. Weathering reactions and their influence on the availability of microelements c. Forms and properties of microelements in the soil d. Their availability and methods for measuring them	**1**	
Soil Acidity and Its Management: a. Soil acidity and its impact on plant growth b. Understanding soil acidity c. How to measure soil acidity and the factors that influence it d. Ways to address the problem of soil acidity e. Definition of liming f. Factors that influence lime requirements g. Methods for measuring lime requirements h. Liming materials and factors that influence their quality i. Methods and timing of liming	**1**	
Wetland Fertility and Nutrient Management: a. Paddy soil (redox potential and nutrient availability, physiological diseases, and nutrient balance) b. Soils in tidal swamps (organosols and acid/potential sulfate soils)	**1**	
Understanding Soil Fertility Evaluation (Special Topic): a. Basic evaluation of soil fertility b. Symptoms of nutrient deficiency	**1**	

c. Biological tests d. Plant analysis e. Soil testing f. Pedogenesis approach		

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Leiwakabessy, F. M., U. M. Wahjudin, dan Suwarno. 2003. Kesuburan Tanah. Jurusan Tanah, Fakultas Pertanian, IPB.
2. Tisdale, S. L, W. L. Nelson, and J. D. Beaton. 1985. Soil Fertility and Fertilizers. 4th ed. MacMillan Publishing Company , New York.
3. Prasad, R and J. F. Power. Soil Fertility Management for Sustainable Agriculture. CRC Press, Boca Raton.
4. Sanchez, P. A. 1976. Properties and Management of Soil in the Tropics. John Wiley and Sons, New York.
5. Brady, N. C. 1990. The Nature and Properties of Soils. 10th ed. MacMillan Publishing Company, New York.
6. Mengel, K. and E. A. Kirkby. 1982. Principles of Plant Nutrition. 2nd ed. International Potash Institute, Bern.
7. Werterman, R. L. 1990. Soil Testing and Plant Analysis. 3rd ed. Soil Sci. Soc. Am., Inc., New York.
8. Andrew, C. S. and E. J. Kamprath. 1978. Mineral Nutrition of Legums in Tropical and Subtropical Soils. CSIRO Publ., Australia.
9. IRRI. 1965. The Mineral Nutrition of the Rice Plant. The Johns Hopkins, Baltimore.
10. Epstein, E and A. J. Bloom. 2003. Mineral Nutrition of Plants: Principles and Perspectives. Secondt Editions. Sinauer Associates, Inc. Publisher, Sunderland.
11. Uehara, G and G. Gillman. 1981. The Mineralogy, Chemistry, and Physics of Tropical Soils with Variable Charge Clays. Westview Press, Boulder, Colorado.
12. Marschner, H. 1995. Mineral Nutrition for Higher Plants. Second Edition. Academic Press, San Diego.
13. Ma, J. F. and E. Takahasi. 2002. Soil, Fertilizer, and Plant Silicon Research in Japan. Elsevier, Amsterdam.
14. De Datta, S.K. 1981. Principles and Practises of Rice Production. John Wiley & Sons, New York.

MSL1330: Agro-Hydrology

A. Module Identity

1	Course Name	Agro – Hydrology
2	Course Code	MSL1330
3	Credit	3(2-1)
4	Semester	4
5	Pre-requisite	
6	Coordinator	
7	Lecturers	
8	Language	
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To explain phenomena and processes related to water, problems encountered in water management, and water management techniques for sustainable development.
2. To manage soil and water conservation and in solving soil and land problems.
3. To provide alternative solutions for water management problems.
4. To manage activities within their scope of work, be honest and responsible, work together, be open and loyal, and have high integrity in carrying out tasks within their scope of activities.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods

1.	Students can measure and analyze water management parameters, especially those related to agriculture, and operate various irrigation/hydrology models.	Direct instruction, discussion	Online Assignment
2.	Students can analyze rainfall characteristics	Direct instruction, discussion	Online Assignment
3.	Students can analyze return periods and rainfall distribution	Direct instruction, discussion	Online Assignment
4.	Students can measure infiltration and process infiltration data	Direct instruction, discussion	Online Assignment
5.	Students can measure hydraulic conductivity and analyze hydraulic conductivity data	Direct instruction, discussion	Online Assignment
6.	Students can measure river discharge	Direct instruction, discussion	Online Assignment
7.	Students can analyze hydrographs	Direct instruction, discussion	Online Assignment
8.	Students can identify problems and present alternatives on water availability, distribution and loss.	Direct instruction, group discussion, presentation	Online Assignment
9.	Students can create and present action plans for water availability problems	Direct instruction, discussion	
10.	Students can identify water related issues in agriculture and create the necessary solution	Presentation, group discussion	Online Assignment

E. Module contents

Topic	Number of Week(s)	Contact Hours
Introduction to Agro – Hydrology	**1**	
Rainfall Characteristics Analysis ● Rain gauge analysis ● Rain data correction ● Average regional rainfall analysis ● Rainfall event probability analysis	**1**	
Return Period and Rainfall Distribution ● Determination of rainfall return periods ● Rainfall distribution	**1**	
Infiltration Measurement: ● Determination of infiltration ● Formulation of infiltration equation	**1**	

Measurement of HC *(Hydraulic Conductivity)*	**1**	
River Discharge Measurement	**1**	
Hydrograph Analysis	**1**	
Water Problem Identification (availability, distribution, loss)	**2**	
Alternative Solution Analysis (Water Balance)	**2**	
Follow-up Analysis (Irrigation and water resource management)	**2**	
Agricultural Water Management	**1**	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Chow, V. T., D.R. Maidment and L. W. Mays. 1989. Applied Hydrology. McGraw-Hill.
2. Dunne, T. and L. B. Leopold. 1978. Water in Environmental Planning. W. H. Freeman and company. San Fransisco.
3. FAO, 1988. Crop Water Requirements. Rome. 144 p.
4. Haridjaja, O., K. Murtilaksono, Sudarmo, dan L.M. Rachman. 1990. Hidrologi Pertanian. Jurusan Tanah, Fakultas Pertanian, IPB. Bogor. 125 p
5. Israelsen, O. W., and V. E. Hansen. 1962. Irrigation Principle and Practices. 3rd ed. John Wiley and Sons. Inc. New York.
6. Sosrodarsono, S., dan K. Takeda. 1978. Hidrologi untuk Pengairan. PT. Pradnya Paramita. Jakarta. 225 p.
7. Sri Harto, Br. 1993. Analisis Hidrologi. PT. Gramendia Pustaka Utama. Jakarta. Haridjaja, O., K. Murtilaksono, Sudarmo, dan L.M. Rachman. 1990.
8. Hidrologi Pertanian. Jurusan Tanah, Fakultas Pertanian, IPB. Bogor. 125 p.

MSL1360: Development Geography

A. Module Identity

1	Course Name	Development Geography
2	Course Code	MSL1360
3	Credit	2 (2 – 0)
4	Semester	4
5	Pre-requisite	-
6	Coordinator	Dyah R Panuju
7	Lecturers	Ernan Rustiadi, Setyardi P Mulya, Andrea E Pravitasari, Vely B Rosandi
8	Language	
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
2								

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To explain fundamental theories related to landscapes and their relationship to human activities, including development processes, qualitative and quantitative approaches related to the location of human activities, and the geographic context of development.
2. To analyse the relationship between human activities in the development process, qualitative and quantitative approaches related to the location of human activities, and the geographic context of development.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods

1.	Students can comprehend and have basic principles of Geography and Development.	Pre-class reading, Short Video, Lectures	Pre – test, Post Test, Quiz
2.	Students can theorize, strategize and create development agenda	Pre – class reading, Short Video, Lectures, Group Discussion	Quiz, Pre – test, Post Test
3.	Students can understand various development theories	Pre – class reading, Lectures, Group Discussion	Group assignment
4.	Students understand classical approach of development	Pre – class reading, Lectures, Group Discussion	Pre – test, Post Test, Quiz
5.	Students can understand the importance of resources for development	Pre – class reading, Lectures, Group Discussion	Pre – test, Post Test, Quiz
6.	Students understand various migration model, and rural-urban linkage	Pre – class reading, Lectures, Group Discussion	Pre – test, Post Test, Quiz
7.	Students understand the trend of labor availability in agriculture	Pre – class reading, Lectures, Class Discussion	Pre – test, Post test
8.	Students understand land ownerships and its relation to land management	Pre – class reading, Lectures, Class Discussion	Pre – test, Post test
9.		Pre – class reading, Lectures, Class Discussion	Pre – test, Post test
10.		Pre – class reading, Lectures, Class Discussion	Pre – test, Post test
11.		Pre – class reading, Lectures, Class Discussion	Pre – test, Post test
12.		Pre – class reading, Lectures, Class Discussion	Pre – test, Post test
13.		Pre – class reading, Lectures, Class Discussion	Pre – test, Post test

E. Module contents

Topic	Number of Week(s)	Contact Hours
Conceptualizing Development, Understanding Development, and Development Geography	1	**2 x 50'**
Balanced Inter – Regional Development, Theory and Practice of Development, Theory and Strategy	1	**2 x 50'**
Understanding Development, People and Development	1	

People and Development, Classical Tradition Approach	1	
Resource and Environment	2	
Village – City Linkages, Urban Space, Rural Space, Agriculture in Peri – Urban Regions	1	
Movements and Flow; Rural Space; Work, Employment, and Development; Population, Labour, Supply and Agriculture	1	
Resources and Environment, Rural Space, Farm and Land Ownership, Agricultural and Environment	1	
Introduction, Climate, Soil	1	
Urban Space, Rural Space, Rural Agriculture Development, Urban Industrial Development	1	
Planning	1	
Spatial Interaction, Migration, and Urbanization; Contemporary Issues in Development	1	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination	Week 8	20%
2.	Final Examination	Week 16	20%
3.	Assessment	Week 1	4%
	Homeworks	Week 2	4%
	Discussion	Week 3	4%
		Week 4	4%
		Week 5	4%
		Week 6	4%
		Week 7	4%
		Week 9	4%
		Week 10	4%
		Week 11	4%
		Week 12	4%
		Week 13	4%
		Week 14	4%
		Week 15	8%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Rustiadi E, Saefulhakim S, Panuju DR. 2009. Perencanaan dan Pengembangan Wilayah. Yayasan Pustaka Obor Indonesia.
2. Potter R, Conway D, Evans R, Evans SL, 2012. Key Concepts in Development Geography. SAGE Publications Ltd.
3. Potter R, Binns T, Elliott J.A, et al, 2018. Geographies on Development: An Introduction to Development Studies, Fourth Edition. London and New York. Routledge
4. Grigg D, 1993. An Introduction to Agricultural Geography, Second Edition. London and New York. Routledge
5. Krugman P, 1998. Development Geography, and Economic Theory. The MIT Press.
6. Hodder R, 2000. Development Geography. London and New York. Routledge

MSL1351: Cartography and GIS

A. Module Identity

1	Course Name	Cartography and GIS
2	Course Code	MSL1351
3	Credit	
4	Semester	4
5	Pre-requisite	
6	Coordinator	Prof. Dr. Baba Barus
7	Lecturers	
8	Language	
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To Identify various fundamental concepts and technical knowledge related to Geographic Information Systems (GIS), including knowledge and technical skills in data entry, various analysis functions, and illustrating GIS applications, particularly in various biophysical, social, and economic environmental issues, and designing final outputs.
2. To utilize GIS and cartography in inventorying soil and land characteristics.
3. To use GIS and cartography in soil mapping.
4. To use GIS and cartography in land use planning and management
5. To manage activities within their scope of work with honesty and responsibility, cooperate, be open and loyal, and possess high integrity in performing tasks within their scope of activities.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students can explain the basic concepts of maps, cartography, GIS, the history of development, and various GIS applications.	Lecture and discussion	
2.	Students can explain the basic concepts of spatial data and data forms in GIS applied in academic and general contexts	Lecture and discussion	
3.	Students can explain the functions of scale, map projection, coordinate systems, and their various uses.	Presentation and discussion	
4.	Students can practice data input and GPS integration with other data or attributes in GIS software.	Videos and Video Assignment	
5.	Students can recognize and understand the steps of initial processing and spatial data management.	Videos and discussion	
6.	Students can explain the functions (analysis), classification, generalization, area, line, point measurement, thematic mapping, and calculation of spatial data indices (statistics and quantification of patterns).	Lecture and discussion	
7.	Students can explain neighboring, connectivity, and overlay functions.	Lecture and discussion	
8.	Students can understand GIS modeling used to present biophysical and socio-economic data.	Videos and discussion	
9.	Students can understand GIS modeling and simulation for the evaluation of physical resources and planning	Videos and discussion	
10.	Students can recognize and understand the design of spatial and cartographic products, both in academic and general contexts.	Videos and discussion	
11.	Students can explain the process of presenting the results of GIS product work in group dynamics.		Group assignment

E. Module contents

Topic	Number of Week(s)	Contact Hours

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination		
2.	Final Examination		

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks

1. Lillesand, T., Kiefer, R. W., & Chipman, J. (2015). Remote sensing and image interpretation. John Wiley & Sons.

Journal articles:

a) Talukdar, S., Singha, P., Mahato, S., Pal, S., Liou, Y. A., & Rahman, A. (2020). Land-use land-cover classification by machine learning classifiers for satellite observations—a review. Remote Sensing, 12(7), 1135.
b) Moore, I. D., Grayson, R. B., & Ladson, A. R. (1991). Digital terrain modelling: a review of hydrological, geomorphological, and biological applications. Hydrological processes, 5(1), 3-30.
c) Cooper, C. H. (2017). Using spatial network analysis to model pedal cycle flows, risk and mode choice. Journal of transport geography, 58, 157-165.
d) Caquard, S. (2013). Cartography I: Mapping narrative cartography. Progress in Human Geography, 37(1), 135-144.

Others:

- Bambang T dan Diar Shiddiq, 2004. Penuntun praktikum SIG dengan menggunakan ArcView.
- Barus, B dan U.S. Wiradisastra, 2000. Sistem Informasi Geografis: Sarana Manajemen Sumberdaya. Lab. Penginderaan Jauh dan Kartografi, Departemen Tanah, Faperta, IPB
- Wiradisastra, U.S., K. Gandasasmita, B. Barus, M. Ardiansyah, dan K. Munibah, 1999. Kartografi (Diktat Kuliah), Lab. Penginderaan Jauh dan Kartografi, Departemen Tanah, IPB
- Haklay, M. (2010). How good is volunteered geographical information? A comparative study of OpenStreetMap and Ordnance Survey datasets. Environment and planning B: Planning and design, 37(4), 682-703. Link: https://kfrichter.org/crowdsourcing-material/day1/haklay10.pdf
- O QuickOSM in github: https://github.com/3liz/QuickOSM

- Projections in QGIS: https://docs.qgis.org/3.16/en/docs/user_manual/working_with_projections/working_with_projections.html
- Attribute in QGIS: https://docs.qgis.org/3.16/en/docs/user_manual/working_with_vector/index.html
- Vector Overlay: https://docs.qgis.org/3.16/en/docs/user_manual/processing_algs/qgis/vectoroverlay.html
- penStreetMap Indonesia: https://openstreetmap.id/en/
- Dzetsaka: https://github.com/nkarasiak/dzetsaka
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1. ArcGIS Online: https://www.esri.com/en-us/arcgis/products/arcgis-online/overview
2. QGIS Cloud: https://qgiscloud.com/
3. Leaflet: https://leafletjs.com/

MSL1301: Research Design and Data Analysis

A. Module Identity

1	Course Name	Research Design and Data Analysis
2	Course Code	MSL1301
3	Credit	2 (2-1)
4	Semester	4
5	Pre-requisite	-
6	Coordinator	Dr Dyah R Panuju
7	Lecturers	Untung Sudadi Dyah Retno Panuju Setyardi Pratika Mulya Desi Nadalia Sri Malahayati
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To gain knowledge, understanding, and skills in designing research related to soil science and land resources.
2. To acquire knowledge, understanding, and skills in applying the concepts of random, systematic, and stratified soil sampling in the field.
3. To develop knowledge, understanding, and skills in testing differences in mean values of two populations, analyzing various experimental data with CRD, RCBD (single-factor and factorial), RCBD-Split Plot, and Split-Split Plot designs. They should also be able to conduct post-hoc tests (LSD, Tukey, and DMRT) and predict missing data.
4. To learn how to use software for research data analysis.
5. To gain knowledge, understanding, and skills in exploring, analyzing, and interpreting soil data, conducting simple and multiple linear regression and correlation analyses, and analyzing multivariate data (PCA).

6. To develop knowledge, understanding, and skills in collecting attribute-based and spatial data, performing non-parametric data analysis, and conducting spatial autocorrelation analysis of land data.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
A.	Lecture		
1.	Students will be able to understand the course contract and explaining the concept of random, systematic, and stratified soil sampling, as well as performing a two-population mean difference test.	Lecture, Class Discussion	Mid Term Examination
2.	Students will be able to explain experiments using a Completely Randomized Design (CRD) with a single factor.	Lecture, Class Discussion	Mid Term Examination
3.	Students will be able to explain experiments using a Randomized Block Design (RBD) with a single factor.	Lecture, Class Discussion	Mid Term Examination
4.	Students will be able to explain factorial experiments using a Completely Randomized Design (CRD) and Randomized Block Design (RBD).	Lecture, Class Discussion	Mid Term Examination
5.	Students will be able to explain factorial experiments using Split Plot Design (SPD) and Split-Split Plot Design (SSPD).	Lecture, Class Discussion	Mid Term Examination
6.	Students will be able to explain the Advanced Test for Differences in Mean Values Due to Treatment (BNT, Tukey, and DMRT).	Lecture, Class Discussion	Mid Term Examination
7.	Students will be able to explain Missing Data Prediction.	Lecture, Class Discussion	Mid Term Examination
8.	Students will be able to explain the types, exploration, analysis, and interpretation of land data.	Lecture, Class Discussion	Assignment, Final Examination
9.	Students will be able to explain simple linear regression and correlation analysis (two soil data variables).	Lecture, Class Discussion	Assignment, Final Examination
10.	Students will be able to explain multiple linear regression analysis of land data.	Lecture, Class Discussion	Final Examination

11.	Students will be able to explain the analysis of multiple soil data variables (PCA).	Lecture, Class Discussion	Final Examination
12.	Students will be able to explain land-based data collection, including attributes and spatial data.	Lecture, Class Discussion	Assignment, Final Examination
13.	Students will be able to explain non-parametric soil data analysis.	Lecture, Class Discussion	Final Examination
14.	Students will be able to explain the auto-spatial correlation analysis of land data.	Lecture, Class Discussion	Final Examination
B.	Practicum		
1.	Students will be able to understand the practicum contract and are skilled in analysing tests of differences in the mean values of two populations.	Lecture, Class Discussion, Practicum	Assignment
2.	Students will be able to analyse various single-factor CRD experimental data.	Lecture, Class Discussion, Practicum	Assignment
3.	Students will be able to analyse various single-factor RBD experimental data.	Lecture, Class Discussion, Practicum	Assignment
4.	Students will be able to analyse various factorial CRD and RBD experimental data.	Lecture, Class Discussion, Practicum	Assignment
5.	Students will be able to analyse various SPD and factorial SSPD experimental data.	Lecture, Class Discussion, Practicum	Assignment
6.	Students will be able to test differences in mean values generated from various methods (BNT, Tukey, DMRT).	Lecture, Class Discussion, Practicum	Assignment
7.	Students will be able to predict missing data	Lecture, Class Discussion, Practicum	Assignment
8.	Students will be able to analyse various CRD and RBD factorial experiments, as well as BNT and DMRT with the help of software.	Lecture, Class Discussion, Practicum	Assignment
9.	Students will be able to analyse various factorial experimental data with SPD and SSPD, as well as BNT and DMRT with the help of software	Lecture, Class Discussion, Practicum	Assignment
10.	Students will be able to analyse simple linear regression,	Lecture, Class Discussion, Practicum	Assignment

	correlation, and multiple linear regression analysis of land data.		
11.	Students will be able to analyse multiple soil data variables using Principal Component Analysis (PCA).	Lecture, Class Discussion, Practicum	Assignment
12.	Students will be able to extract attribute-based and spatial land data.	Lecture, Class Discussion, Practicum	Assignment
13.	Students will be able to analyse non-parametric soil data.	Lecture, Class Discussion, Practicum	Assignment
14.	Students will be able to analyse the spatial autocorrelation of land data.	Lecture, Class Discussion, Practicum	Assignment

E. Module contents

Topic	Number of Week(s)	Contact Hours
A. Lecture		
Concepts of Random, Systematic, and Stratified Soil Sampling; Two-Sample Mean Difference Test for Populations.	**1**	**2**
Experiment with a Completely Randomized Design (CRD) with a Single Factor.	**1**	**2**
Experiment with a Randomized Block Design (RBD) using a Single Factor.	**1**	**2**
Factorial Experiments with CRD and RBD.	**1**	**2**
Factorial Experiment with SPD and SSPD	**1**	**2**
Further Tests of Differences in Mean Values Due to Treatment (BNT, Tukey, and DMRT).	**1**	**2**
Missing Data Prediction	**1**	**2**
1. Data measurement scale 2. Chi Squared Test	**1**	**2**
Simple Linear Regression and Correlation Analysis (Two Soil Data Variables).	**1**	**2**
Multiple Linear Regression Analysis of Soil Data	**1**	**2**
Analysis of Multiple Soil Data Variables (PCA).	**1**	**2**
Attribute- and Spatial-Based Soil Data Retrieval.	**1**	**2**
Nonparametric Soil Data Analysis.	**1**	**2**
Spatial Autocorrelation Analysis of Soil Data.	**1**	**2**
B. Practicum		
1. Research vs. Trial 2. Testing the Difference Between the Mean Values of Two Populations.	**1**	**3**
Analysing Variance of CRD Experimental Data (Single Factor).	**1**	**3**
Analysing Variance of RBD Experimental Data (Single Factor).	1	3
Analysing the Variance of Factorial CRD and RBD Experimental Data.	1	3

Analysing the Variance of SPD and Factorial SSPD Experimental Data.	1	3
Testing the Difference in Mean Values Due to Treatment (BNT, Tukey, DMRT).	1	3
Missing Data Prediction Exercise	1	3
Variance in CRD and RBD Factorial Experiments, as well as BNT & DMRT using software	1	3
Variance of Factorial Experimental Data with SPD and SSPD, as well as BNT & DMRT using software	1	3
Simple Linear Regression and Correlation Analysis, as well as Multiple Linear Regression Analysis of Soil Data.	1	3
Multi-Variable Soil Data Analysis (PCA) Exercise	1	3
Retrieving Attribute-Based and Spatial Land Data.	1	3
Non-Parametric Soil Data Analysis.	1	3
Spatial Auto-Correlation Analysis of Land Data.	1	3

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Steel RGD, Torrie JH. 1993. Terjemahan. Bambang Sumantri: Prinsip dan Prosedur Statistika: Suatu Pendekatan Biometrik. Edisi ke-2. Jakarta (ID): PT Gramedia Pustaka Utama.
2. Gomez KA, Gomez AA 1984, Statistical Procedures for Agriculture Research. 2nd Ed. New York (ID): John Wiley and Sons.
3. Sudadi U, Nadalia D, Panuju DR, Setyardi SP, Yusuf SM. 2021. Penuntun Praktikum Desain Penelitian dan Teknik Analisis Data. Departemen Ilmu Tanah dan Sumberdaya Lahan, Fakultas Pertanian, IPB. Bogor [ID]: DITSL IPB.

Journal articles:

a)

Others:

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SEMESTER 5

MSL1310: Pedology

A. Module Identity

1	Course Name	Pedology
2	Course Code	MSL1310
3	Credit	3 (2-1)
4	Semester	5
5	Pre-requisite	-
6	Coordinator	Dr Suwardi
7	Lecturers	Dyah Tjahyandari S., Hermanu Widjaja, Darmawan
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To explain the processes of soil formation, from minerals and rocks to soil parent materials, and from soil parent materials to soil through pedogenesis.
2. To describe the morphological properties of soil in the field, including horizonation, color, texture, structure, consistency, and other morphological characteristics.
3. To classify soil based on the Soil Taxonomy system, FAO/UNESCO/WRB, and PPT, and understand the GSM system and the distribution of soil types in Indonesia.
4. To analyze pedogenesis, soil morphology, and classification to manage and maintain the sustainability of soil and land functions.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
A.	**Lecture**		
1.	Students will be able to explain the meaning, scope, history, and development of paedology, as well as its relationship with other sciences.	Lecture, Class Discussion	Written Test, Assignment
2.	Students will be able to explain the differences between mineral soil materials and organic soil materials, the types of easily weathered and resistant minerals, and the types of rocks from which the parent soil material originates.	Lecture, Class Discussion	Written Test, Assignment
3.	Students will be able to explain the physical, chemical, and biological weathering processes of minerals and rocks, as well as the pedogenesis processes that are important in soil formation.	Lecture, Class Discussion	Written Test, Assignment
4.	Students will be able to explain the meanings of horizon, pedon, polypedon, and profile, as well as solum, and provide nomenclature for soil horizons.	Lecture, Class Discussion	Written Test, Assignment
5.	Students will be able to explain and determine soil colour using the Munsell colour chart and assess soil texture in the field.	Lecture, Class Discussion	Written Test, Assignment
6.	Students will be able to explain and determine soil structure and consistency in dry, damp, and wet conditions in the field.	Lecture, Class Discussion	Written Test, Assignment
7.	Students will be able to describe the conditions of rocks, slopes, root distribution, and other morphological characteristics.	Lecture, Class Discussion	Written Test, Assignment
8.	Students will be able to explain the meaning and purpose of land classification, the types of land classification, and the history of land classification.	Lecture, Class Discussion	Written Test, Assignment
9.	Students will be able to classify soil into the order and suborder categories of the Soil Taxonomy system.	Lecture, Class Discussion	Written Test, Assignment

10.	Students will be able to classify soil into the great group and subgroup categories of the Soil Taxonomy system.	Lecture, Class Discussion	Written Test, Assignment
11.	Students will be able to classify soil into the family and series categories of the Soil Taxonomy system.	Lecture, Class Discussion	Written Test, Assignment
12.	Students will be able to classify soil according to the FAO/UNESCO/WRB classification system.	Lecture, Class Discussion	Written Test, Assignment
13.	Students will be able to classify land according to the 2014 PPT system.	Lecture, Class Discussion	Written Test, Assignment
14.	Students will be able to explain how the data in GSM can describe the distribution of land in Indonesia.	Lecture, Class Discussion	Written Test, Assignment
B.	**Practicum**		
1.	Students will be able to explain how to create soil profiles, describe soil morphological properties, and record land characteristics using soil description cards.	Practicum, Group Discussion	Report
2.	Students will be able to: a. to accurately describe the morphological characteristics of the soil profile. b. to explain the morphological characteristics of soils found in Indonesia and their environmental features.	Practicum, Group Discussion	Report
3.	Students will be able to describe the morphological characteristics of soil profiles found in Indonesia.	Practicum, Group Discussion	Report, Presentation
4.	Students will be able to determine the genetic horizon based on field observations and experimental data.	Practicum, Group Discussion	Report
5.	Students will be able to accurately describe soil profiles, environmental factors, and soil morphological characteristics based on field observations and laboratory data.	Practicum, Group Discussion	Report
6.	Students will be able to explain the results of determining the morphological characteristics of soil and the environmental	Practicum, Group Discussion	Report, Presentation

	conditions in which it was formed.		
7.	Students will be able to accurately determine the soil characteristic horizons (epipedon, lower characteristic horizon, and other soil characteristics).	Practicum, Group Discussion	Report
8.	Students will be able to systematically classify soil using Soil Taxonomy in the Order category.	Practicum, Group Discussion	Report, Presentation
9.	Students will be able to systematically classify soil using Soil Taxonomy, starting from Order, followed by Sub-order, Great group, and Sub-group.	Practicum, Group Discussion	Report, Presentation
10.	Students will be able to differentiate soil families and classify soil into Soil Family categories using Soil Taxonomy.	Practicum, Group Discussion	Report
11.	Students will be able to systematically classify soil using the National Soil Classification / Soil Research Center in the categories of Soil Type and Soil Subtype.	Practicum, Group Discussion	Report
12.	Students will be able to systematically classify soil using the FAO/UNESCO Soil Classification in the categories of Soil Groups and Soil Units.	Practicum, Group Discussion	Report
13.	Students will be able to explain the land classification system used in Indonesia.	Practicum	Presentation

E. Module contents

Topic	Number of Week(s)	Contact Hours
A. Lecture		
Introduction: a. Understanding Paedology b. Scope of Paedology c. Definition and History of the Development of the Concept of Land d. Relationship Between Pedology and Other Sciences	**1**	**2**
Soil Parent Material: a. Definition of Mineral Soil Materials and Organic Soil Materials	**1**	**2**

b. Types of Minerals and Rocks from Which Soil Parent Material Originates		
Weathering of Minerals and Rocks & Pedogenesis Processes: a. Weathering Processes of Minerals and Rocks: Chemistry, Physics, and Biology b. Important Pedogenesis Processes	**1**	**2**
Morphological Properties: Horizontization a. Definition of Pedon and Polypedon b. Understanding Profile and Solum c. Main Horizons and Nomenclature of Horizons	**1**	**2**
Morphological Properties: Physical Properties of Soil (1) a. Color b. Texture	**1**	**2**
Morphological Properties: Physical Properties of Soil (2) a. Structure b. Soil Consistency	**1**	**2**
Other Morphological Properties: a. Rocks b. Slope c. Distribution of Plant Roots d. Other Characteristics	**1**	**2**
Soil Classification System: a. Definition and Objectives of Soil Classification b. History of Soil Classification c. Types of Soil Classification (Special and General)	**1**	**2**
Soil Taxonomic System: Order and Suborder a. Order Category b. Suborder Category	**1**	**2**
Soil Taxonomic System: Great Group and Subgroup a. Great Group Category b. Subgroup Categories	**1**	**2**
Soil Taxonomic Systems: Families and Series a. Family Category b. Series Category	**1**	**2**
FAO/UNESCO System 1974-2014 a. Development of the FAO/UNESCO Soil Classification b. FAO/UNESCO Soil Classification System	**1**	**2**
PPT System 1983-2014 a. Development of PPT Land Classification b. PPT 2014 Land Classification System	**1**	**2**
GSM Classification System and Land Distribution in Indonesia	**1**	**2**
B. Practicum		
Introduction: Explanation of land description cards.	**1**	**3**
Observation of Soil Profiles in Indonesia: (Latosol, Spodosol, Organosol/Peat, Podzolic, Mediterranean, Gleisol, Regosol, Andosol, Grumusol).	**1**	**3**
Discussion of the Morphological Characteristics of Soils in Indonesia	**1**	**3**

Observation of the Application of Genetic Horizons to Soils in Indonesia (Latosol, Spodosol, Organosol/Peat, Podzolic, Mediteran, Gleisol, Regosol, Andosol, Grumusol).	**1**	**3**
Make a Description of the Land in Indonesia (Latosol, Spodosol, Organosol/Peat, Podzolic, Mediteran, Gleisol, Regosol, Andosol, Grumusol).	**1**	**3**
Presentation and Discussion of Soil Morphological Characteristics from Descriptions of Soil Profiles in Indonesia.	**1**	**3**
Determination of Epipedon, Lower Horizon, and Other Defining Characteristics.	**1**	**3**
Soil Classification Based on Soil Taxonomy in Order Categories.	**1**	**3**
Soil Classification Based on Soil Taxonomy in the Categories of Order, Suborder, Great Group, and Subgroup	**1**	**3**
Soil Classification Based on Soil Taxonomy in the Family Category	**1**	**3**
Soil Classification using the National Soil Classification / Soil Research Center, in the categories of Soil Order and Soil Type.	**1**	**3**
FAO/UNESCO Soil Classification System	**1**	**3**

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination		30%
2.	Final Examination		30%
3.	Practicum		30%
4.	Assignment		10%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Rachim, D.A. dan Suwardi. 2000. Morfologi dan Klasifikasi Tanah. Jurusan Tanah, Fakultas Pertanian, Institut Pertanian Bogor.
2. Buaol, S.W., Hole, F.D., and McCracken R.J. 1988. Soil Genesis and Classification. The Iowa State University Press, Ames.
3. Birkeland, P.W. 1974. Pedology, Weathering, and Geomorfological Research. New York, Oxford University Press, London.
4. P, Duchafour. 1977. Pedology : Pedogenesis and Clasification. Masson, Paris.
5. Stelley, M. CoEd. 1974. Histosol, Their Characteristics, Classification, and Use. Soil Science Society of America, Madison, Wisconsin, USA.
6. Soil Survey Staff. 2014. Keys to Soil Taxonomy 12th Edition. Soil Conservation Service USDA
7. FAO/UNESCO. 2014. World Reference Base For Soil Resources 2014. FAO, Italy

8. Badan Penelitian dan Pengembangan Pertanian. 2014. Petunjuk Teknis Klasifikasi Tanah Nasional. Balai Besar Litbang Sumberdaya Lahan Pertanian, Bogor.
9. Global Soil Map Specifications. 2015. ISRIC (International Soil Reference and Information Centre).

MSL1331: Soil and Water Conservation

A. Module Identity

1	Course Name	Soil and Water Conservation
2	Course Code	MSL1331
3	Credit	
4	Semester	5
5	Pre-requisite	
6	Coordinator	
7	Lecturers	
8	Language	
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. Able to explain aspects of land degradation, reclamation of degraded land, erosion processes, and the application of KTA principles in conservation agricultural planning to support the sustainable use of agricultural land resources.
2. Able to act as an analyst for inventorying issues related to soil and land degradation/damage.
3. Able to determine soil conservation measures to address land degradation issues.
4. Able to manage work activities with honesty, responsibility, cooperation, openness, and professionalism.
5. Loyal and possess high integrity in fulfilling duties within their area of responsibility.
6. Independent in planning conservation and rehabilitation for degraded land and sustainable agriculture.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
A	Lecture		
1.	Explain various scopes and applications of soil and water conservation in relation to sustainable agricultural development	Lecture and discussion	Written test
2.	Explain various scopes and applications of soil and water conservation in relation to sustainable agricultural development	Lecture, discussion, practical exercises, assignments, short tests	Written test, practical report
3.	Explain various scopes and applications of soil and water conservation in relation to sustainable agricultural development	Lecture, discussion, practical exercises, assignments, short tests	Written test, practical report
4.	Explain various scopes and applications of soil and water conservation in relation to sustainable agricultural development	Lecture, discussion, practical exercises, assignments, short tests	Written test, practical report
5.	Explain various scopes and applications of soil and water conservation in relation to sustainable land capability and soil conservation	Lecture, discussion, practical exercises, assignments, short tests	Written test, practical report
6.	Explain various problem areas and innovative technologies for rehabilitating degraded land	Problem-Based Learning (PBL)	Written test, PBL report
7.	Explain various scopes and applications of conservation agriculture planning and the socio-economic aspects of soil and water conservation	Problem-Based Learning (PBL)	Written test, PBL report
B	Practicum		
1.	students will be able to calculate the amount of erosion using the USLE formula and plan, design, and construct soil conservation structures to support sustainable agricultural land use	Direct learning, assignment	Written test
2.			

E. Module contents

Topic	Number of Week(s)	Contact Hours
Introduction, scope, and issues of soil and water conservation in relation to sustainable agricultural development	**2**	
Erosion and the correlation of soil physical properties with erosion processes, types, and influencing factors	**1**	
Methods, analysis, and use of soil and water conservation methods	**1**	
Erosion prediction models and their use in planning conservation farming systems	**1**	
Relationship between land capability and soil conservation	**1**	
Problems and innovative technologies for rehabilitating degraded land	**1**	
Conservation agriculture planning and socio-economic aspects of soil and water conservation	**1**	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Test 1		25%
2.	Test 2		20%
3.	PBL Report		30%
4.	Practicum		25%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Arsyad, S. 2006. Konservasi Tanah dan Air. IPB Press. Bogor.
2. Baver, L. D., Gardner, W. H., and W. R. Gardner. 1972. Soil Physics. John Wiley & Sons. Inc. NY., London, Sydney, Toronto.
3. Bennet, H. H. 1939. Soil Conservation. Prentice Hall. NY.
4. Haan, C. Y., H. P. Johnson, and D. L. Brakenstek. 1982. Hydrologyc Modeling of Small Watersheds. An ASAE Monograph Nr. S. Michigan.
5. Hillel, D. 1980. Fundamentals of Soil Physics. Academic Press, N.Y., London, Toronto, Sydney, San Fransisco.
6. Hudson, N. 1971. Soil Conservation. Cornell University Press. NY.
7. Lowdermilk, W.C. 1953. Conquest of the land through seven thousand years, Bull. Soil Conservation Service, USDA.
8. Schwab, G. O., Frevert, R. K., Edminister, T. W., and K. K. Barnes. 1981. Soil Water Conservation Engineering. John Wiley & Sons, NY, Chichester, Brisbane, Toronto.
9. Stalling, 1957. Soil Conservation. Prentice Hall, NY.

10. M. Troeh, F. R., J. A. Hobbs, and R. L. Donahue. 1980. Soil and Water Conservation for Productivity and Environmental Protection. Prentice Hall Inc. Englewood Cliffs, NY

Others:

- Beasly, D. B. and L. F. Huggins. 1981. ANSWER User's manual. Agricultural Engineering Department, Purdue Univ. West Lafayette. Indiana.
- Sinukaban, N. 1986. dasar-dasar Konservasi Tanah dan Air dan Perencanaan Pertanian Konservasi.
- Sinukaban, N. 1989. Manual Inti, Konservasi Tanah dan Air di Daerah Pertanian.

MSL1400: Publication and Science Communication

A. Module Identity

1	Course Name	Publication and Science Communication
2	Course Code	MSL1400
3	Credit	2
4	Semester	5
5	Pre-requisite	-
6	Coordinator	Dr Darmawan
7	Lecturers	Dr Darmawan Indri Hapsari F Desi Nadalia
8	Language	Bahasa Indonesia
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To explain the relationship between knowledge, science, technology, and scientific research; the patterns of scientific reasoning and underlying logic; as well as the processes, procedures, and ethical considerations involved in scientific writing.
2. To differentiate between good and poor scientific papers and select appropriate ones to use as references.
3. To understand the stages of scientific writing, including proposals and research results, and present the results communicatively to support sustainable development.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to explain the relationship between knowledge, science, technology, and scientific research, and understand the role of scientific publications in this context. Additionally, able to independently carry out the implementation stages, from the preparation phase and fieldwork to the presentation of results.	Lecture, Class Discussion	Class Discussion, Group Discussion
2.	Students will be able to outline the characteristics of scientists and researchers, distinguish between ideas and research topics, and detail the construction of problem formulations and the preparation of hypotheses.	Lecture, Class Discussion	Class Discussion, Group Discussion
3.	Students will be able to explain the types of research based on methodology and choose research types according to ideas or topics in the field of soil science.	Lecture, Class Discussion	Class Discussion, Group Discussion
4.	Students will be able to identify the characteristics of scientific publications in the form of papers in quality journals.	Group Discussion, Class Discussion	Presentation, Class Discussion, Group Discussion
5.	Students will be able to identify the characteristics of scientific publications in the form of papers in low-quality journals.	Group Discussion, Class Discussion	Presentation, Class Discussion, Group Discussion
6.	Students will be able to independently prepare a research proposal.	Independent Study	Assignment, Proposal
7.	Students will be able to create popular scientific writing in graphic form.	Group Discussion, Class Discussion	Presentation, Class Discussion, Group Discussion
8.	Students will be able to create land unit maps from the survey data collected.	Practicum	Assignment, Report

E. Module contents

Topic	Number of Week(s)	Contact Hours
Introduction: What is knowledge, Science, Technology, Publications- Scientific Communication	**1**	**2**

1. Scientist and Researcher 2. Reason and Ethics 3. Research Ideas and Topics 4. Problem Formulation 5. Basic Assumptions 6. Hypotheses	**1**	**2**
Variety of Research by Methodology: Methods, Procedures, Techniques, and Types of Research Methods.	**1**	**2**
Selection and Discussion of Papers Published in Reputable Journals	**2**	**4**
Selection and Discussion of Papers Published in Disreputable Journals.	**2**	**4**
Scientific Writing Guidelines, Standard Journal Formats, and Various Research Methods.	**3**	**6**
Selected existing publications	**2**	**4**
Map Completion: Creating Land Map Unit	**2**	**4**

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination		15%
2.	Final Examination		15%
3.	Group Assignment		35%
4.	Individual Assignment		25%
5.	Class Participation		10%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1.

Journal articles:

a)

Others:

-

MSL1404: Soil and Climate Change

A. Module Identity

1	Course Name	Soil and Climate Change
2	Course Code	MSL1404
3	Credit	
4	Semester	5
5	Pre-requisite	
6	Coordinator	
7	Lecturers	
8	Language	
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To explain the carbon cycle in soil and the atmosphere, calculate emission factors from a commodity, and describe the principles of calculating greenhouse gas emission balances in various natural landscapes, cultivated lands, and their combinations.
2. To explain and categorize the various roles of soil management and land use in carbon storage and release and other components of greenhouse gases.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students can explain the phenomenon of climate change over time with an emphasis on the	Lectures, chatting, discussion, assignments	Online Assignment

	contribution of soil process dynamics		
2.	Students can explain various ecological terms related to emission balance and carbon cycle	Lectures, chatting, discussion, assignments	Online Assignment
3.	Students can explain the mechanism of greenhouse gas release into the atmosphere as a cause of climate change originating from soil	Lectures, chatting, discussion, assignments	Online Assignment
4.	Students can explain the influence of physical, chemical, and biological factors of soil in storing and releasing carbon from soil	Lectures, chatting, discussion, assignments	Online Assignment
5.	Students can Explaining the cycle and release of carbon and other elements as greenhouse gas components from mineral and organic soils	Lectures, chatting, discussion, assignments	Online Assignment
6.	Students can Explaining the principles of measuring greenhouse gas fluxes from soil	Lectures, discussion, assignments	Structured and Independent Tasks
7.	Students can Categorizing the roles of soil management and land use in storing and releasing carbon and other greenhouse gas components	Lectures, discussion,	Structured and Independent Tasks
8.	Students can Evaluating the calculation of emission factors from a commodity	Lectures, group assignments, discussion	Structured and Independent Tasks
9.	Students can Explaining the principles of calculating greenhouse gas emission balances in various natural landscapes, cultivated lands, and their combinations	Lectures, assignments, discussion	Structured and Independent Task

E. Module contents

Topic	Number of Week(s)	Contact Hours
Climate Change	**1**	
Ecological Terms in Emission Balance and Carbon Cycle	**1**	
Greenhouse Gas Emission from Soil	**1**	
Physical, Chemical, and Biological Factors in Soil Carbon Storage and Emission	**2**	
Carbon Cycle and Carbon Emission from Minerals and Organic Soils	**1**	
Greenhouse Gas Flux Measurement	**1**	
Soil Management and Land use in Carbon Storage and Carbon Emission	**1**	

Emission Factors from a Commodity	**1**	
Erosion Prediction Models, Soil and Water Conservation in Watershed, Conservation Farming Planning	**2**	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Soil Fauna: Key to Soil Organic Matter dynamics and Modelling.Juan J. Jiménez & Juliane Filser (Eds.)
2. Soil Carbon. Editors. Alfred E. Hartemink Kevin McSweeney

Journal articles:

A) Hoyle, FC, Murphy, DV & Fillery, IRP 2006, 'Temperature and stubble management influence microbial CO2-C evolution and gross N transformation rates', Soil Biology and Biochemistry, vol. 38, pp. 71–80.

B) Ingram, JSI, Fernandes, ECM 2001, 'Managing carbon sequestration in soils: concepts and terminology', Journal of Agriculture, Ecosystems and Environment, vol. 87, pp. 111–117, viewed 15 October 2018, https://www.sciencedirect.com/science/article/pii/S0167880901001451

C) Christos Gougoulias, Joanna M Clark and Liz J Shaw. The role of soil microbes in the global carbon cycle: tracking the below-ground microbial processing of plant-derived carbon for manipulating carbon dynamics in agricultural systems. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4283042/pdf/jsfa0094-2362.pdf

Others:

- What is soil organic carbon (https://www.agric.wa.gov.au/measuring-and-assessing-soils/what-soil-organic-carbon)
- Hoyle, FC 2013, Managing soil organic matter: A practical guide, Grains Research and Development Corporation, Kingston, viewed 15 October 2018, https://grdc.com.au/resources-and-publications/all-publications/publications/2013/07/grdc-guide-managingsoilorganicmatter.

MSL1440: Soil Biotechnology and Bioprospecting

A. Module Identity

1	Course Name	Soil Biotechnology and Bioprospecting
2	Course Code	MSL1440
3	Credit	3
4	Semester	5
5	Pre-requisite	-
6	Coordinator	Prof. Dr. Dwi Andreas Santosa, MS
7	Lecturers	
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To understand the importance of soil biotechnology and its supporting sciences/technologies in utilizing soil organisms and their derivative components in agricultural, environmental, and industrial fields.
2. To become a soil biotechnology analyst and address soil, environmental, and industrial problems.
3. To create an inventory and identify the biotechnological properties of soil.
4. To utilize soil biotechnology to provide alternative solutions to various problems.
5. To manage activities within the scope of their work, demonstrating honesty, responsibility, collaboration, openness, loyalty, and high integrity in carrying out tasks.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to understand the importance of soil biotechnology and its supporting sciences/technologies in utilizing soil organisms and their derivative components in agricultural, environmental, and industrial fields.	Lecture, Video, Class Discussion	Pre – Test, Post – Test, Assignment
2.	Students will be able to understand the importance of soil biotechnology and its supporting sciences/technologies in utilizing soil organisms and their derivative components in the fields of agriculture, the environment, and industry.	Lecture, Video, Class Discussion	Pre – Test, Post – Test, Assignment

E. Module contents

Topic	Number of Week(s)	Contact Hours
Introduction	**1**	
Biofertilizer Technology: a. Rhizobium isolation techniques b. Rhizobium purification, testing, and preservation techniques	**1**	
Biofertilizer Technology: a. Fermentation techniques b. Selection of carrier materials, manufacturing, and quality testing of inoculants	1	
Biofertilizer Technology: a. Microbial isolation b. Characterization c. Fermentation and inoculant manufacturing	1	
Biofertilizer Technology: a. Mycorrhiza and Its Role b. Isolation and Multiplication Techniques	1	
Soil Biotechnology for the Environment: a. Life Requirements b. Population and Distribution c. Ecology	1	
Soil Biotechnology for Environmental Applications	1	
Soil Biotechnology for Environmental Applications: a. Soil and Environmental Pollution from Petroleum Waste b. Bioremediation of Petroleum-Contaminated Soil c. Biotechnology for Controlling Petroleum Waste	1	
Soil Biotechnology for Industrial Applications:	1	

a. Types of Industrial Enzymes b. Isolation of Enzyme-Producing Soil Microbes c. Testing Enzyme Activity and Production		
Soil Biotechnology for Industrial Applications: a. Types of Antibiotics and Their Mechanisms of Action b. Isolation of Antibiotic-Producing Soil Microbes c. Isolation and Characterization of Antibiotics from Soil Microbes	1	
Molecular Biotechnology for Soil: a. Isolation of DNA from Soil and Other Natural Materials b. Metagenomic Technology to Produce Enzymes and Other Products from Soil DNA c. Viruses in Soil: Their Detection and Control	1	
Genetic Engineering for Soil Science: a. Basic Techniques of Genetic Engineering b. Use of Genetic Engineering to Utilize Soil-Based Genes c. Release of GMOs and Their Impact on Soil Ecology	1	
Composting Technology: a. Isolation of Microbes that Decompose Organic Matter b. Multiplication and Production of Inoculants for Composting	1	
Composting Technology: a. Composting Techniques b. Packaging, Quality Testing, and Marketing of Compost	1	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Daniel, R. 2005. Metagenomics of soil. Nature Rev. Microbiol.3:470-478.
2. Hurst, C.J., Knudsen, G.R., McInerney, M.J., Stezenbach, L.D., and Walter, M.V. 1997. Manual of Environmental Microbiology. ASM Press, Washington D.C.
3. Lynch, J.M. 1983. Soil Biotechnology. Microbiological Factors in Crop Productivity. Blackwell Scientific Publ. Oxford.
4. Madigan, M.T., Martinko, J.M., Parker, J. 2003. Brock Biology of Microorganisms. 10th Edtion, Pearson Education, Inc. NJ.
5. Metting, F.B. 1993. Soil Microbial Ecology. Application in Agricultural and Environmental Management. Marcel Decker, Inc. New York.

MSL1461: Spatial Planning and Regional Development

A. Module Identity

1	Course Name	Spatial Planning and Regional Development
2	Course Code	MSL1461
3	Credit	
4	Semester	5
5	Pre-requisite	
6	Coordinator	Dr. Dyah R Panuju
7	Lecturers	
8	Language	
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To explain the basic conceptual framework of spatial planning and regional development planning;
2. To analyze spatial patterns of land resource interrelationships with spatial patterns of concentration and development of business/industrial activities and supporting systems;
3. To explain the spatial planning process and the development planning of spatial patterns towards more suitable development objectives: measurability, interrelationships, balance, growth, independence, and sustainability.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
A	**Lectures**		
1.	Students can understand regulations and legislations regarding spatial planning and the basic concepts of regional development planning	Direct learning, discussion, assignments, practicum.	Written tests, practicum reports, and task reports.
2.	Students can use various analytical techniques to solve spatial planning and land use problems	Direct learning, discussion, assignments, practicum.	Written tests, practicum reports, and task reports.
3.	Students can explain the basic conceptual framework of regional development planning and explain and perform basic technical skills related to linking spatial patterns of land resources with spatial patterns of concentration and development of business/industry activity chains and their supporting systems	Direct learning, discussion, assignments, practicum.	Written tests, practicum reports, and task reports.
4.	Students can understand the process of planning for the development of spatial patterns towards goals of development: measurability, interconnectedness, balance, growth, self-reliance, and sustainability	Direct learning, discussion, assignments, practicum.	Written tests, practicum reports, and task reports.
5.	Students can understand the regulations regarding spatial planning and the basic concepts of regional development planning	Direct learning, discussion, assignments, practicum.	Written tests, practicum reports, and task reports.
6.	Students can use various analytical techniques to solve spatial planning and land use problems	Direct learning, discussion, assignments, practicum.	Written tests, practicum reports, and task reports.
7.	Students can to explain the basic conceptual framework of regional development planning and explain and perform basic technical skills related to linking spatial patterns of land resources with spatial patterns of concentration and development of business/industrial activities and supporting systems	Direct learning, discussion, assignments, practicum.	Written tests, practicum reports, and task reports.
8.	Students can understand the process of planning spatial patterns towards goals of development: measurability, interconnectedness, balance, growth, independence, and sustainability.	Direct learning, discussion, assignments, practicum.	Written tests, practicum reports, and task reports.
B	**Practicum**		

1.	Students will be able to understand, know, and independently practice analysing population and economic growth models using the linear, quadratic, exponential, and saturation models.	Pre – class reading, Induction, group discussion	Practicum report
2.	Students will be able to understand, know, and independently practice analysing the concentration of agricultural and non-agricultural activities using LQ, LI, and SI indices.	Pre – class reading, Induction, group discussion	Practicum report
3.	Students will be able to understand, know, and independently practice analysing population growth rate and decomposition using Shift Share Analysis (SSA) and LQ analysis techniques.	Pre – class reading, Induction, group discussion	Practicum report
4.	Students will be able to understand, know, and independently practice spatial analysis and regional typology with cluster analysis techniques.	Pre – class reading, Induction, group discussion	Practicum report
5.	Students will be able to understand, know, and independently practice the stages and procedures for preparing regional regional development planning documents.	Pre – class reading, Induction, group discussion	Practicum report
6.	Students will be able to understand, practice, identify, and directly apply the analyses taught in the case of regional planning.	Pre – class reading, Induction, group discussion	Practicum report, Group presentation with Q&A session
7.	Students will be able to understand, know, and independently practice the spatial hierarchy of service centres using scalogram analysis.	Pre – class reading, Induction, group discussion	Practicum report

8.	Students will be able to understand, know, and independently practice regional development analysis using the entropy index analysis method	Pre – class reading, Induction, group discussion	Practicum report
9.	Students will be able to understand, know, and independently practice analysis of income distribution and inequality using the Gini index and Williamson index methods.	Pre – class reading, Induction, group discussion	Practicum report
10.	Students will be able to understand, know, and independently practice regional interaction analysis using the Newtonian gravity model and regression model.	Pre – class reading, Induction, group discussion	Practicum report
11.	Students will be able to understand, know, and independently practice composite analysis using the factor analysis model.	Pre – class reading, Induction, group discussion	Practicum report
12.	Students will be able to understand, practice, identify, and directly apply the analyses taught in the case of regional planning.	Pre – class reading, Induction, group discussion	Practicum report, Group presentation with Q&A session
13.	Students will be able to understand, identify, describe, and critically assess the results of journal reviews in regional development planning.	Pre – class reading, Induction, group discussion	Journal Review, Group presentation with Q&A session

E. Module contents

Topic	Number of Week(s)	Contact Hours
1. Introduction and Basic Philosophy of Learning Concepts 2. Introduction to Spatial Planning and Regional Development Planning a. Definitions b. Benefits c. Examples	**1**	

1. Concepts, Definitions, and Benefits, Examples in Space and Region 2. Basic Pillars of the Concepts of Life: a. Life Systems and Structure of Life Need b. Land Resource System and Geobiophysical Ecosystem c. Cultivation and Technology System d. Business/Industry System and Economy e. Physical Infrastructure System and Spatial Planning Social and Institutional System.	**1**	
1. Spatial Planning and Spatial Arrangement: a. Definitions b. Patterns c. Structures d. Analytical Techniques e. Understanding, Objectives, Elements 2. Principles of Spatial Arrangement 3. Basic Concepts of Location Theory: a. Patterns b. Principles of Dynamics c. Spatial Hierarchy	**1**	
1. Theory of Land Rent and Dynamics of Land Use: a. Definition and theory of land rent b. Types of land rent c. Methods of measuring land rent d. Determining factors of land rent e. Relationship and influence of land rent on spatial utilization patterns and land use f. Definition of land use g. Calculation of land rent for various land uses 2. Theory of land conversion 3. Analysis of Spatial Distribution and Central Hierarchy 4. Analysis of Spatial Distribution/concentration: a. Specialization Index b. Localization Index c. Location Quotient 5. Analysis of Spatial Concentration Dynamics: Shift-Share Analysis: a. Aggregate Growth b. Sectoral Competitiveness c. Locational Competitiveness 6. Analysis of Central Hierarchy: Scallogram Central Hierarchy.	**1**	
1. Land Evaluation for Regional Spatial Planning:	**1**	

a. Principles and roles of land evaluation b. Definition of cultivation areas c. Types of cultivation areas d. Techniques for evaluating agricultural and non-agricultural land 2. Regionalization Analysis and Regional Typology: a. Basic Concepts of Regions b. Regional Typology and Regionalization c. Framework of Approaches and Techniques for Regionalization Analysis and Regional Typology: • Principal Components Analysis • Cluster Analysis • Spatial Clustering, • Discriminant Function Analysis		
1. Land Evaluation for Conservation Area Spatial Planning: a. Definition of conservation areas b. Types of conservation areas c. Techniques for evaluating conservation land 2. Spatial Interaction System Analysis: a. Basic Framework for Spatial Interaction Analysis b. Newton's Gravity Model Approach in Spatial Interaction Analysis c. Maximum Entropy Model Approach in Spatial Interaction Analysis d. Model Parameter Estimation Methods: • Multiple Regression Method • Log-Linear Poisson Model • Iteration Method	**1**	
1. Location Theory and Industrial Space Theory: a. Spatial data and spatial analysis b. Origins of Location Theory c. Classical Location Theories (von Thunen, Losch, Christaller, etc.) d. Comprehensive location theory for Industry Types of industries and characteristics of spatial utilization e. Settlement location theory settlement criteria f. Patterns and spatial structure for settlements g. Types of settlements and characteristics of spatial utilization 2. Basic Models of Development Strategy: a. Milestones in the Development of Development Strategy Models in Indonesia	**1**	

b. Three Basic Models of Development Strategy (Supply-Side et al.): • Illustrative examples • Advantages, and disadvantages of each model • Case Studies of Development Strategy Implementation: ○ Rural-Urban Linkage Model ○ Regionally Based Special Allocation Fund Management Model ○ Participative Regional Development Model (Counterpart Funding, etc.) ○ Agropolitan Development Model.		
Location Theory, Spatial Planning, and Transportation Systems: a. Transportation theory b. Interconnection of transportation systems with spatial planning	**1**	
Analysis of Regional Institutional Systems: a. Key dimensions of regional institutional system analysis b. Basic Institutional Structure of the Region c. Spatial ecological-economic interaction system among Basic Institutional Structures of the Region d. Key dimensions of land resources, patterns of organization, and effectiveness of institutional systems in regional development.	**1**	
Agricultural Spatial Planning: a. Integrated agricultural system b. Patterns and structure of agricultural spatial planning	**1**	
Basic Concepts of Planning Theory: a. Basic Framework of Planning Approaches b. Strategic Planning c. Long-Term Planning d. Technical Operational Planning	**1**	
Spatial Hierarchy of Service Centers: a. Definition of regional hierarchy b. Calculation of service center hierarchy c. Examples of the regional hierarchy	**1**	
Analysis of Regional Development Performance Indicator Systems: a. Framework of System Approach in Measuring Regional Development Performance	**1**	

b. Basic Logic and Techniques for Measuring Performance Indicators in the Input Subsystem c. Basic Logic and Techniques for Measuring Performance Indicators in the Process Subsystem d. Basic Logic and Techniques for Measuring Performance Indicators in the Output Subsystem e. Basic Logic and Techniques for Measuring Performance Indicators in the Outcome Subsystem f. Basic Logic and Techniques for Measuring Performance Indicators in the Impacts Subsystem.		
1. Planning Theory 2. Social Capital, and Planning as a Tool for Social Change 3. Planning Theory 4. Definition of Social Capital 5. Planning as Social Change and Investment in Social Capital 6. Relationship between Planning and Institutional Development 7. Framework of Regional Development Planning Process: a. Goal Formulation Process b. Information Management Process c. Problem Structure Formulation and Development Opportunities Process d. Resource Valuation and Evaluation Process e. Alternative Development Assessment Process f. Optimization and Plan Formulation Process g. Focus Illustration: • Land Use Planning/Spatial Planning for Rural Development (Agropolitan Development, Watershed Management, etc.)	**1**	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Final Examination	Week 16	20%
2.	Mid Term Examination	Week 8	20%
3.	Practicum Report	Week 1	4%
		Week 2	4%
		Week 3	4%
		Week 4	4%
		Week 5	4%
		Week 6	4%

		Week 9	4%
		Week 10	4%
		Week 11	4%
		Week 12	4%
		Week 13	4%
4.	Mini Project 1	Week 7	4%
5.	Mini Project 2	Week 14	4%
6.	Journal Review	Week 15	8%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Barlowe, R. 1978. Land resources Economics. The economics of Real Estate. Third Edition. Prentice Hill, Inc. Englewood Cliffs, New Jersey. USA.
2. Dicken, P and Lloyd P.E. 1990. Location in Space. Theoritical Perspectives in Economic Geography.
3. Faludi, A. 1973. Planning Theory. Pergamon press. 307 pp.
4. Blakely EJ. 1994. *Planning Local Economic Development: Theory and Practice.* Sage Publications.
5. Isard W. 1969. *Methods in Regional Analysis.* MIT Press.
6. Isard W. 1975. *Introduction to Regional Science.* Prentice-Hall, Inc.
7. Morrisey GL. 2002. *Morrisey dan Perencanaan: Pemikiran Strategis, Perencanaan Jangka Panjang dan Perencanaan Taktis.* Prehalindo, Jakarta.
8. Rustiadi E, Saefulhakim H.R.S, dan Panuju D.R. 2011. *Perencanaan Pengembangan Wilayah*. Crestpent dan Yayasan Obor Indonesia, Jakarta.
9. Schofield J. 1989. *Cost-Benefit Analysis in Urban & Regional Planning.* Unwin Hyman Inc., London.

Others:

- FAO. 1993. Guidelines for Land-Use Planning. FAO Development Series 1.
- Rustiadi, E., Saefulhakim S, Panuju D.R. 2004. Diktat Perencanaan dan Pengembangan Wilayah. Crestpent dan Yayasan Obor Indonesia, Bogor.
- Sitorus, SRP. 2014. Pengembangan Sumberdaya Lahan Berkelanjutan. Departemen Ilmu Tanah dan Sumberdaya Lahan, Fakultas Pertanian, Institut Pertanian Bogor.
- FAO. 1992. *Guidelines for Land Use Planning.* FAO of the UN.

SEMESTER 6

MSL1421: Amelioration and Fertilization Technology

A. Module Identity

1	Course Name	Amelioration and Fertilization Technology
2	Course Code	MSL1421
3	Credit	3(2-1)
4	Semester	6
5	Pre-requisite	
6	Coordinator	Budi Nugroho
7	Lecturers	Lilik Tri Indriyati, Heru Bagus Pulunggono dan Desi Nadalia
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To explain the problems related to soil conditions that need improvement according to plant growth requirements.
2. To understand the appropriate materials for enhancing soil conditions and their properties, as well as how to carry out amelioration
3. To evaluate the condition and nutrient status of soil and plants, recognize fertilizers as sources of nutrients, understand the properties of fertilizers, and grasp the fundamentals of fertilization
4. To gain skills in implementing fertilization practices, including explaining the efficiency and economics of fertilization, calculating fertilizer needs, and making recommendations for fertilization programs

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
A.	**Lecture**		
1.	Students will be able to understand and articulate the meaning of amelioration, ameliorants, and their properties, which can be used to improve soil conditions.	Lecture, Class Discussion	Written Test, Assignment
2.	Students will know and understand the soil conditions that need amelioration in terms of chemical and physical properties.	Lecture, Class Discussion	Written Test, Assignment
3.	Students will know how to calculate ameliorant requirements for various soil conditions.	Lecture, Class Discussion	Written Test, Assignment
4.	Students will understand the various sources of nitrogen nutrients, their properties, and reactions in the soil.	Lecture, Class Discussion	Written Test, Assignment
5.	students will understand the various sources of phosphorus fertilizers, their properties, and reactions in the soil.	Lecture, Class Discussion	Written Test, Assignment
6.	students will understand the various sources of potassium (K), calcium (Ca), magnesium (Mg), and sulphur (S) fertilizers, their properties, and reactions in the soil.	Lecture, Class Discussion	Written Test, Assignment
7.	Students will understand various sources of micronutrient and compound fertilizers, their properties, and reactions in the soil.	Lecture, Class Discussion	Written Test, Assignment
8.	Students will be able to describe methods for evaluating nutrient status.	Lecture, Class Discussion	Written Test, Assignment
9.	Students will be able to explain soil testing techniques.	Lecture, Class Discussion	Written Test, Assignment
10.	Students will be able to explain plant analysis techniques and interpret the results of plant analysis.	Lecture, Class Discussion	Written Test, Assignment
11.	Students will be able to explain the fundamentals of fertilization.	Lecture, Class Discussion	Written Test, Assignment

12.	Students will be able to explain the economic aspect and efficiency of fertilization and liming.	Lecture, Class Discussion	Written Test, Assignment
13.	Students will be able to explain fertilizer preparation procedure, offer recommendations and develop fertilization programs.	Lecture, Class Discussion	Written Test, Assignment
B.	**Practicum**		
1.	Students will be able to understand the rules and practicum contracts.	Lecture, Class Discussion	Practicum Test
2.	Students will be able to explain the meaning of fertilizer and the different types of fertilizer.	Lecture, Class Discussion, Practicum	Assignment and Practicum Test
3.	Students will be able to observe and identify nutrient deficiencies in oil palm and banana.	Lecture, Class Discussion, Practicum	Assignment and Practicum Test
4.	Students will be able to observe and identify nutrient deficiencies in coffee and corn.	Lecture, Class Discussion, Practicum	Assignment and Practicum Test
5.	Students will be able to observe and identify nutrient deficiencies in sugar cane and rice.	Lecture, Class Discussion, Practicum	Assignment and Practicum Test
6.	Students will be able to prepare the management of experimental land for fertilization.	Lecture, Class Discussion, Practicum	Assignment and Practicum Test
7.	Students will be able to describe the agricultural systems they encountered in real life.	Lecture, Class Discussion	Assignment and Practicum Test
8.	Students will be able to explain the results of identifying nutrient deficiency symptoms in various plants at different locations.	Lecture, Class Discussion	Assignment and Practicum Test
9.	Students will be able to conduct the plus-one test and minus-one test, as well as perform fertilizer calculations.	Lecture, Class Discussion, Practicum	Assignment and Practicum Test
10.	Students will be able to accurately measure plant height and apply fertilizers correctly.	Lecture, Class Discussion	Assignment and Practicum Test
11.	Students will be able to explain the amelioration of various planting media.	Lecture, Class Discussion	Assignment and Practicum Test
12.	Students will be able to process data and create reports.	Lecture, Class Discussion	Assignment and Practicum Test
13.	Students will be able to engage in independent discussions.	Lecture, Class Discussion	Assignment and Practicum Test

E. Module contents

Topic	Number of Week(s)	Contact Hours
A. Lecture		
Amelioration a. Definition b. Defining Ameliorant c. Types of Ameliorants and Its Characteristics	**1**	
1. Soil with poor chemical properties 2. Soil type with poor physical properties 3. Effects on plant growth	**1**	
Calculating Ameliorants Required to improve soil conditions	**1**	
1. Raw materials for nitrogen fertilizers 2. Types and properties of nitrogen fertilizers 3. Nitrogen fertilizers related reactions in the soil 4. Factors to consider when using nitrogen fertilizers	**1**	
1. Raw materials for phosphorus fertilizer 2. Mining of phosphorus fertilizer materials 3. Types and properties of phosphorus fertilizer 4. Reactions of phosphorus fertilizer in the soil 5. Considerations for phosphorus fertilizer use	**1**	
1. Raw materials for potassium fertilizer 2. Mining of potassium fertilizer materials 3. Types and properties of potassium fertilizer 4. Reactions of potassium fertilizer in the soil 5. Considerations for using potassium fertilizer 6. Calcium fertilizer 7. Magnesium fertilizer 8. Sulphur fertilizer	**1**	
1. Micronutrients: Fe, Mn, Cu, Zn, Cl, B, and Mo 2. Types of compound fertilizers 3. NPK content ratio in compound fertilizers	**1**	
1. The role of nutrient evaluation 2. Methods for evaluating nutrient status	**1**	
1. The philosophy of soil testing 2. The development of soil tests 3. Correlation and calibration 4. Soil testing methods 5. Soil sampling	**1**	
1. The purpose of plant analysis 2. Problems in plant analysis 3. The relationship between nutrient levels, age, and production 4. Factors that influence plant nutrient composition 5. Practical applications of plant analysis 6. Techniques for plant sampling 7. Handling of plant samples 8. Plant analysis in the laboratory 9. Interpretation of plant analysis results 10. The integrated diagnosis and recommendation system	**2**	

1. Plant characteristics 2. Soil properties 3. Fertilizer placement 4. Fertilizer movement 5. Salt index 6. Timing for fertilizer application 7. Effect of carryover 8. Rotational fertilization and intercropping	**1**	
1. Law of Diminishing Returns 2. Advantages of Using Fertilizers 3. Economics of Liming 4. Efficient Use of Fertilizers	**1**	
1. General Fertilizer Recommendations 2. Site-Specific Fertilizer Recommendations 3. Fertilization Program	1	
B. Practicum		
Introduction	1	
1. Definition of fertilizer 2. Trade name, nutrient composition, chemical composition, form of fertilizer, and the main and secondary elements.	1	
Nutrient deficiencies in oil palm and banana	1	
Nutrient deficiencies in coffee and corn	1	
Nutrient deficiencies in sugar cane and rice	1	
Preparation and management of land for fertilization trials	1	
Agricultural System: Real Life Application	1	
Nutrient Deficiencies in Various Locations	1	
Plus one test, minus one test, and fertilizer calculations	1	
Plant height measurement	1	
Amelioration of various planting media	1	
Data Analysis and Reporting	1	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Pupuk dan Pemupukan (F.M. Leiwakabessy dan A. Sutandi, 2004)
2. Soil Fertility and Fertilizers (Tisdale *et al*., 1985)
3. Fertilizers and Fertilization (Finck, 1982)
4. Fertilizers and Soil Amendment (Follet *et al.*, 1981)

MSL1462: Quantitative Regional Modeling

A. Module Identity

1	Course Name	Quantitative Regional Modeling
2	Course Code	MSL1462
3	Credit	2(2 – 0)
4	Semester	5
5	Pre-requisite	
6	Coordinator	Dr. Andrea Emma Pravitasari
7	Lecturers	Dyah Retno Panuju, PhD; Vely Brian Rosandi, MPWK
8	Language	
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
2		2*50'*14 = 1400'						

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To explain fundamental theories related to human activities, including development processes, quantitative approaches related to the location of human activities, and their context in regional development planning.
2. To perform spatial quantitative analysis and spatial prediction methods and understand the mathematical and statistical principles of the methods discussed in the context of regional development planning.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to identify, learn, and understand spatial quantitative methods' context of analysis, definitions, and critical terms.	Pre – class reading and lecture	Pre-tests, Post tests
2.	Students will be able to identify, learn, and understand Measures of Data Centralization and Dispersion (non-spatial and spatial).	Pre – class reading and lecture	Pre-tests, Post tests, Quiz
3.	Students can identify, learn, and understand Data collection techniques, basic assumptions, and technical aspects of GWR analysis	Pre – class reading and lecture	Pre-tests, Post tests, Quiz
4.	Students will be able to identify, learn, and understand the general principles of data grouping (clustering), types of cluster methods, and their implementation in regionalization/zoning case studies.	Pre – class reading and lecture	Pre-tests, Post tests, Quiz
5.	Students will be able to identify, learn, and understand the collection of numerical and categorical data, assumptions, and analysis techniques in logistic regression	Pre – class reading and lecture	Pre-tests, Post tests, Quiz
6.	Students will be able to identify, learn, and understand the general principles and basic assumptions in discriminant analysis, related parameter testing, and case examples in regional development planning.	Pre – class reading and lecture	Pre-tests, Post tests, Quiz
7.	Students will be able to identify, learn, and understand the general principles and basic assumptions related to the linear equation system (LES), scenario development, methods, outputs, and case illustrations in simple contexts and regional development planning.	Pre – class reading and lecture	Pre-tests, Post tests, Quiz
8.	Students will be able to use/implement the methods they have learned to address issues and	Pre – class reading and lecture	Mini Project 1, Mini Project 2

	find solutions in the context of regional development planning.		
9.	Students will be able to present/explain the results of their review on using spatial quantitative analysis methods to address cases in the context of regional development planning and find solutions to the issues raised.	Lecture	Group presentation

E. Module contents

Topic	Number of Week(s)	Contact Hours
Introduction to Quantitative Regional Modeling; Measures of Data Centralization and Dispersion (non-spatial and spatial)	**1**	
Measure of Data Centralization and Dispersion	**1**	
Local Regression Analysis with Geographically Weighted Regression (GWR)	**1**	
Cluster Analysis (Clustering Analysis)	**1**	
Logistic Regression/Categorical Data	**1**	
Discriminant Function Analysis (DFA)	**1**	
Linear Equation System (LES)	**1**	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination	Week 8	20%
2.	Final Examination	Week 16	20%
3.	Mini Projects	Week 12, Week 15	50%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Barbara G. Tabachnick and Linda S. Fidell, 2012. Using Multivariate Statistics.
2. Borrough, P.A and R.A. McDonell. 2000. Principles of Geographical Information System. Oxford University Press. Inc. New York
3. Christopher D.Lloyd. 2010. Spatial Data Analysis: An Introduction for GIS Users. Oxford University Press

4. Cressie, N,A.C. 1993. Statistic for Spatial Data. John Wiley and Sons. Inc. New York
5. Fischer, M. M., Getis, A. 2010. Handbook of Applied Spatial Analysis. Springer.
6. Fotheringham, A.S., Brundson, C., and Charlton, M. 2002. Geographically Weighted Regression: The Analysis of Spatially Varying Relationship. England: John Wiley and Sons.
7. Getis, A. 2010. Perspective on Spatial Data Analysis. Springer Heidelberg Dordrecht London. New York
8. Lee, J and Wong, D.W.S. 2001.Statistical Analysis with Arview GIS. John Wiley and Sons . Inc. New York
9. Longley, P.A; M.F Goodchild; D.J. Maguire and D.W. Rhihn. 2005. Geographical Information System and Science. John Wiley &Sons Ltd. England
10. Schabenberger, O. and Gotway C. A. Statistical Methods for Spatial Data Analysis. Chapman & Hall.
11. Sheskin, D. J. 2004. Handbook of Parametric and Nonparametric Statistical Procedures. CRC Press.

MSL1401: Theory of Survey, Mapping, and Land Evaluation

A. Module Identity

1	Course Name	Theory of Survey, Mapping, and Land Evaluation
2	Course Code	MSL1401
3	Credit	
4	Semester	6
5	Pre-requisite	
6	Coordinator	Darmawan
7	Lecturers	Bambang H. Trisasongko Dyah Tjahyandari S. Hermanu Widjaja Iskandar Wahyu Purwakusuma Putri Oktariani
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			
	3.0							

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To explain the concepts and methodologies of surveying and evaluating land resources accurately and efficiently.
2. To understand the stages of survey implementation and effectively present the results to support sustainable development.
3. To explain land evaluation techniques and discuss the challenges in developing a land evaluation system.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to explain the concepts and methodologies of land resource surveying and evaluation accurately and efficiently, as well as capable of carrying out the stages and presenting the results effectively to support sustainable development.	Lecture, Independent Work	Written Test
2.	Students will be able to explain the types and levels of land resource surveys and mapping.	Lecture, Independent Work	Written Test
3.	Students will be able to explain the connection between other sciences and land resource surveys and mapping.	Lecture, Independent Work	Written Test
4.	Students will be able to explain survey techniques, stages of survey implementation, survey administration, and preparation.	Lecture, Independent Work	Written Test
5.	Students will be able to explain field exploration techniques, as well as methods for observation and sampling during surveys.	Lecture, Independent Work	Written Test
6.	Students will be able to explain survey data analysis and present them.	Lecture, Independent Work	Written Test
7.	Students will be able to explain survey and mapping techniques.	Lecture, Independent Work	Written Test
8.	Students will be able to explain various concepts of sustainable land evaluation.	Lecture, Independent Work	Written Test
9.	Students will be able to explain the land evaluation system for agricultural purposes.	Lecture, Independent Work	Written Test
10.	Students will be able to explain the land evaluation system for non-agricultural purposes.	Lecture, Independent Work	Written Test
11.	Students will be able to explain land evaluation techniques and the challenges of developing a land evaluation system.	Lecture, Independent Work	Written Test
12.	Students will be able to explain the problems and experiences of surveying and evaluating land resources in dryland areas.	Lecture, Independent Work	Written Test

13.	Students will be able to explain the problems and experiences in surveying and evaluating land resources in wetland areas.	Lecture, Independent Work	Written Test
14.	Students will be able to explain alternative land resource evaluation approaches empirically and rationally, considering the advantages and challenges of a land resource unit based on its physical dimensions for use.	Lecture, Independent Work	Written Test

E. Module contents

Topic	Number of Week(s)	Contact Hours
Introduction: Definition and Scope a. Definition and function of land resources from a sustainable development perspective b. Definition, scope, and usefulness of land resource surveys and evaluations c. The position and role of supporting sciences in surveying and mapping land resources	1	
Land Resource Survey and Mapping Concept a. Types of land resource surveys and mapping b. Levels of land resource surveys and mapping	**1**	
Review of Related Sciences (Geology, Geomorphology, Soil Classification, Cartography/GIS) a. Use of supporting information (geology, remote sensing imagery, climate, etc.) in land resource surveys and mapping b. Methods for searching and collecting supporting information	**1**	
Survey and Mapping Techniques a. Approaches to data collection and delineation of mapping units b. Stages of conducting surveys and mapping of land resources c. Administration and preparation	1	
Survey and Mapping Techniques (2) Field exploration, observation, and sampling techniques.	1	
Survey and Mapping Techniques (3) Data analysis and presentation of results.	1	
Survey and Mapping Techniques 4	1	
Land Evaluation Concept a. The concept of direct and indirect assessment of land potential b. Understanding land characteristics, land quality, and land use requirements	1	

c. Approaches and general framework for land evaluation procedures		
Land Evaluation System (1): Land evaluation system for the agricultural sector.	1	
Land Evaluation System (2): Land evaluation system for specific non-agricultural purposes.	1	
Land Evaluation Techniques a. Land evaluation using computer systems and parametric systems b. Challenges in developing a land evaluation system	1	
Problems/Experiences in Surveying and Evaluating Land Resources: Dryland	1	
Problems/Experiences in Surveying and Evaluating Land Resources: Wetlands	1	
Alternative Approaches to Evaluating Land Resources Empirically and Rationally: Empirical approach to assessing the advantages and challenges of a land resource unit based on its physical dimensions for use.	1	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination		50%
2.	Final Examination		50%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Anonymous. 1993. Soil Survey Manual. Soil Survey Staff, USDA.
2. Rossiter, D. G. Lecture Notes & Reference Methodology for Soil Resource Inventories. 2nd Revised Version Soil Science Division International Institute for Aerospace Survey & Earth Sciences (ITC). March 2000.
3. Prof. Santun RP Sitorus, Evaluation of Land Resources
4. Abdullah, T. S. 1993. Survai Tanah dan Evaluasi Lahan. Penebar Swadaya, Jakarta.
5. Puslittanak. 1983. Petunjuk Teknis Evaluasi Lahan:

MSL1411: Indonesian Soil Geography

A. Module Identity

1	Course Name	Indonesian Soil Geography
2	Course Code	MSL1411
3	Credit	2
4	Semester	6
5	Pre-requisite	
6	Coordinator	
7	Lecturers	
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To relate the distribution of soil types and characteristics with general agricultural cultivation patterns in Indonesia.
2. To apply land geography in surveying, evaluation, and land use planning.
3. To inventory soil and land characteristics based on geographical factors.
4. To manage activities within the scope of work, with honesty, responsibility, teamwork, openness, loyalty, and high integrity.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to relate the distribution of soil types and characteristics to the general patterns of agricultural cultivation in Indonesia.	Hands – on learning, Class Discussion	
2.	Students will be able to understand the role of parent materials in influencing the characteristics of the soil that is formed.	Hands – on learning, Class Discussion	
3.	Students will be able to understand the role of climate in influencing the characteristics of the soil that is formed.	Hands – on learning, Class Discussion	
4.	Students will be able to understand the relationship between landforms and slope.	Hands – on learning, Class Discussion	
5.	Students will be able to identify the major soil types in Indonesia, understand their characteristics, and know their distribution and usage across the country.	Hands – on learning, Class Discussion	
6.	Students will be able to learn about the soils in karst areas, their regional distribution, and their potential uses in Indonesia.	Hands – on learning, Class Discussion	
7.	Students will be able to learn about geological units formed by water movement and their characteristics.	Hands – on learning, Class Discussion	
8.	Students will be able to differentiate between wetlands, drylands, and artificial wetlands (rice fields) based on their characteristics and understand the potential environmental issues that may arise in wetlands.	Hands – on learning, Class Discussion	
9.	Students will be able to differentiate between types of peat and understand the processes that lead to the formation of various peat soils.	Hands – on learning, Class Discussion	
10.	Students will be able to understand the processes, characteristics, and management of acid sulphate soil.	Hands – on learning, Class Discussion	

11.	Students will be able to identify various issues that can occur in acid sulphate soils and their management.	Hands – on learning, Class Discussion	
12.	Students will be able to identify the characteristics, location distribution, and land management practices in floodplain environments.	Hands – on learning, Class Discussion	
13.	Students will be able to learn about the use of peatlands in Indonesia.	Hands – on learning, Class Discussion	

E. Module contents

Topic	Number of Week(s)	Contact Hours
Introduction	**1**	**2**
Soil Forming Factors: Parent Material	**1**	**2**
Soil Forming Factors: Climate	**1**	**2**
Soil Forming Factors: Topography	**1**	**2**
Soil Types in Indonesia: a. Latosol b. Podzolic	**1**	**2**
Soil Types in Indonesia: Andosol	**1**	**2**
Soils in Karst Areas: a. Grumosol b. Mediteran c. Renzina	**1**	**2**
Water Movement: a. Sedimentation b. Erosion	**1**	**2**
Wetlands and artificial wetlands (rice fields)	**1**	**2**
Peat Land	**1**	**2**
Acid sulphate soil: genesis, characteristics, and management	**1**	**2**
Acid sulphate soil (continued): Experiences of failure to utilize peatlands, resulting in the formation of acid sulphate soil.	**1**	**2**
Floodplain environments: Their distribution, characteristics, and management.	**1**	**2**
Utilization of peatlands in Indonesia: Prospects and challenges.	**1**	**2**

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Brady, M.A. 1997. Dynamics of Coastal Peat Deposits in Sumatra, Indonesia. Disertation. The University of British Columbia.
2. Bohn, H.L., B.L. McNeal, and G.A. O'Connor. 2001. Soil chemistry 3rd Edition. John Wiley and Sons. 307 p.
3. Fisher. Brown. Scott. McGowen. 1969. Delta Systems In The Explanation For Oil And Gas. Bureau of Economic Geology The University of Texas at Austin. Austin, Texas.
4. Furukawa, H. 1994. Coastal Wetlands of Indonesia Environment, Subsistence and Exploitation. Kyoto UniversityPress. Japan. 219p.
5. Melling, L. Joo, G.K, Uyo, L.J. Sayok, A. Hatano, R. 2007. Biophysical Characteristics of Tropical Peatland. Malaysian Soil Science Conference. Mukah, Sarawak.
6. Mohr, E. C. J. 1938. The Soils of Equatorial Regions With Special Reference To The Netherlands East Indies. Ann Arbor, Michigan.
7. Osaki, M., Tsuji, N. 2015. Tropical Peatland Ecosistem. Springer. Japan.
8. Paramananthan, S., 1998. Malaysian Soil Taxonomy - Second Approximation. Mal. Soc. Soil Science and Param Agriculture Soil Surveys (M) Sdn. Bhd., Serdang, Selangor.
9. Ponnamperuma, F.N. 1972. The chemistry of submerged soils. Adv. Agron., 24: 29–96.
10. Tan, K.H. 2008. Soil in The Humic Tropics and Monsoon Region of Indonesia. CRC Press. USA.
11. Tan, K.H. 2011. Principles of Soil Chemistry 4th Edition. CRC Press. USA.

MSL1403: Soil Remediation

A. Module Identity

1	Course Name	Soil Remediation
2	Course Code	MSL1403
3	Credit	
4	Semester	6
5	Pre-requisite	-
6	Coordinator	Dr. Iskandar
7	Lecturers	Dr. Untung Sudadi Dr. Gunawan Djajakirana
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To explain the concepts of pollution, contamination, and remediation effectively and efficiently.
2. To explain the mechanisms and reactions involved in soil remediation efforts.
3. To explain the causes of pollution and estimate the remediation efforts that can be undertaken.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to explain the meanings of pollution, contamination, and remediation, as	Lecture, Independent Study, Assignment	Written Test, In Class Assignment

	well as the reasons why remediation efforts need to be carried out.		
2.	Students will be able to explain the concepts, types, and assessment of land degradation.	Lecture, Independent Study, Assignment	Written Test, In Class Assignment
3.	Students will be able to explain the importance of pollution risk assessment and the methods used for assessing risks related to pollution and contamination.	Lecture, Independent Study, Assignment	Written Test, In Class Assignment
4.	Students will be able to identify and explain the sources and types of contaminants.	Lecture, Independent Study, Assignment	Written Test, In Class Assignment
5.	Students will be able to explain the role of soil mineralogy and its relationship to the functions of soil as a filter, buffer, and transformer.	Lecture, Independent Study, Assignment	Written Test, In Class Assignment
6.	Students will be able to explain the chemical reactions and mechanisms involved in the buffering of dissolved contaminants.	Lecture, Independent Study, Assignment	Written Test, In Class Assignment
7.	Students will be able to understand and explain the transport of contaminants in soil and groundwater.	Lecture, Independent Study, Assignment	Written Test, In Class Assignment
8.	Students will be able to explain the important processes in remediation caused by microbial activity.	Lecture, Independent Study, Assignment	Written Test, In Class Assignment
9.	Students will be able to explain the fundamental processes of bioremediation	Lecture, Independent Study, Assignment	Written Test, In Class Assignment
10.	Students will be able to explain the fundamentals of phytoremediation.	Lecture, Independent Study, Assignment	Written Test, In Class Assignment
11.	Students will be able to explain remediation conducted using electrokinetic methods.	Lecture, Independent Study, Assignment	Written Test, In Class Assignment
12.	Students will be able to explain the reactions that occur during the soil remediation process.	Lecture, Independent Study, Assignment	Written Test, In Class Assignment
13.	Students will be able to explain the methods used in groundwater remediation activities.	Lecture, Independent Study, Assignment	Written Test, In Class Assignment
14.	Students will be able to explain the encapsulation of waste rock that generates acid - mine drainage.	Lecture, Independent Study, Assignment	Written Test, In Class Assignment

E. Module contents

Topic	Number of Week(s)	Contact Hours
INTRODUCTION: a. Terminology: Pollution, contamination, remediation **b.** Why soil and groundwater need to be remediated	**1**	**2**
SOIL DEGRADATION: **a.** Concept and Definition of Land Degradation **b.** Types of Land Degradation **c.** Assessment of Land Degradation	**1**	**2**
POLLUTION RISK ASSESSMENT: **a.** The Need for Risk Assessment When Reusing Polluted Land **b.** Risk Assessment Methods for Soil, Surface Water, and Groundwater Pollution and Contamination	**1**	**2**
SOURCES AND TYPES OF CONTAMINANTS/POLLUTANTS: **a.** Inorganic/Heavy Metals **b.** Organic Compounds	**1**	**2**
SOIL AS FILTER, BUFFER, TRANSFORMER (1): **a.** Soil Mineralogy and Surface Properties of Clay **b.** Mechanisms of Contaminant Filtration	**1**	**2**
FUNCTION OF SOIL AS FILTER, BUFFER, TRANSFORMER (2): • **Soil Chemical Reactions:** Hydrolysis, dissolution, precipitation, complexation • **Buffer Mechanism for Dissolved Contaminants**	**1**	**2**
TRANSPORT OF CONTAMINANTS IN SOIL AND GROUNDWATER	**1**	**2**
IMPORTANT MICROBIAL PROCESSES IN REMEDIATION: • **Metabolic Classification of Microorganisms** • **Aerobic Respiration** • **Electron Transport Chain** • **Anaerobic Respiration and Redox Conditions**	**1**	**2**
SOIL REMEDIATION (1): BIOREMEDIATION • **Fundamental Processes in Bioremediation:** Aerobic and Anaerobic Biodegradation, Reductive Dehalogenation, Co-metabolism • **Soils Contaminated with Crude Oil**	**1**	**2**
SOIL REMEDIATION (2): PHYTOREMEDIATION • **Basics of Phytoremediation** • **Phytoextraction** • **Phytodegradation** • **Phytovolatilization** • **Phytostabilization**	**1**	**2**

SOIL REMEDIATION (3): ELECTROKINETIC METHOD • **Technical Equipment Used** • **Treatable Contaminants**	**1**	**2**
SOIL REMEDIATION (4): • **Chemical Reactions** • **Deposition and Stabilization** • **Soil Vapor Extraction** • **Soil Extraction and Washing** • **Excavation**	**1**	**2**
GROUNDWATER REMEDIATION: • **Introduction and Investigation Methods** • **Physical Methods** • **Ex-Situ Methods** • **In-Situ Methods**	**1**	**2**
Encapsulation of Waste Rock that Produces Acid Mine Drainage	**1**	**2**

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination		35%
2.	Final Examination		35%
3.	Quiz 1		10%
4.	Quiz 2		10%
5.	Class Participation		10%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Meuser, H. 2013. Soil Remediation and Rehabilitation: Treatment of Contaminated and Disturbed Land. Springer. Heidelberg, New York, London
2. Nathanail, C.P. and R.P. Bardos. 2004. Reclamation of Contaminated Land. John Wiley & Sons. Sussex
3. Cairney, T. 1995. The Re-Use of Contaminated Land: A Handbook of Risk Assessment. John Wiley & Sons. Sussex
4. Notodarmojo, S. 2005. Pencemaran Tanah dan Air Tanah. Penerbit ITB, Bandung.

MSL1402: Field Practice of Survey, Mapping and Land Evaluation

A. Module Identity

1	Course Name	Field Practice of Survey, Mapping and Land Evaluation
2	Course Code	MSL1402
3	Credit	
4	Semester	6
5	Pre-requisite	
6	Coordinator	Ir. Hermanu Widjaja, M.Sc.Agr
7	Lecturers	Ir. Hermanu Widjaja, MSc.Agr Dr.Ir. Darmawan, MSc Dr.Ir. Iskandar Ir. Wahyu Purwakusuma, MSc Dr.Ir. Dyah Tjahyandari S., M.Appl.Sc Putri Oktariani, SP, M.Agr Dr.Ir. Bambang Hendro Trisasongko, MSc. Dr. Wahyu Iskandar, SHut, MAgr
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods

1.	Students will be able to: a. understand the plan for the practicum material, rules, regulations, and scoring system. b. explain the background, objectives, materials, equipment, methodology, and results of land surveys and land evaluations at various mapping scales.	Practicum, Class Discussion	Presentation, Quiz, Class Discussion
2.	Students will be able to: a. Able to explain the contents of previous land survey results. b. Able to understand the contents of the Terms of Reference (TOR) for land surveys and land evaluations.	Class Discussion, Project Based Learning	Presentation, Quiz, Class Discussion, Final Examination
3.	Students will be able to: a. describe the contents of the terms of reference for land survey and land evaluation projects. b. identify basic map requirements in land surveys. c. identify work map requirements according to the TOR and plan the acquisition of missing basic data in accordance with the TOR. d. prepare work maps and analyse supporting data.	Project Based Learning, Group Discussion, Land Survey and Evaluation Group Work	Survey, Map Output, Final Examination
4.	Students will be able to: a. create work maps and supporting maps for land surveys and land evaluations. b. interpret the contents of work maps and supporting data and incorporate them into the proposal.	Project Based Learning, Group Discussion, Land Survey and Evaluation Group Work	Proposal draft, Final Examination
5.	Students will be able to:	Project Based Learning, Group Discussion, Land	Scheduling, Budget Plan

	a. (1) Able to prepare a survey activity schedule according to the TOR. b. (2) Able to organize a survey team based on the needs outlined in the TOR. c. (3) Able to develop operational plans for the survey team in the field. d. (4) Able to determine the required tools and materials for land survey and land evaluation projects. e. (5) Able to calculate the number of observations, representative profiles, types and quantities of samples, laboratory analyses, etc., as needed. f. (6) Able to prepare budget and cost plans (RAB) for land survey and land evaluation activities.	Survey and Evaluation Group Work	
6.	Students will be able to: a. present land survey and land evaluation project proposals. b. revise the proposal based on feedback from the presentation.	Class Discussion, Proposal Presentation Review	Presentation, Final Examination
7.	Students will be able to: a. prepare the required tools and materials. b. process permits for land survey and evaluation activities. c. plan the mobilization and demobilization of the survey team.	Collaborative work	Survey Preparation, Final Examination
8.	Students will be able to: a. plan and conduct land cover data acquisition and DEM (Digital Elevation Model) at the required level of detail using UAV (Drone).	Field Practice, Collaborative Work	Drone and Theodolite Data, Final Examination

	b. perform terrestrial measurements using a theodolite.		
9.	Students will be able to: a. process, interpret, and create land cover maps (land use) of survey areas obtained from drone acquisition. b. process data acquired from the theodolite.	Class Discussion, Group Discussion, Project Based Learning	Land Use Map, Detailed Topography Map, Final Examination
10.	Students will be able to: a. organize survey teams in the field. b. read work maps that are spacious and suitable for the survey area. c. navigate to the entry point and determine the direction of the transect, as well as the site for drilling and profile observations. d. measure the characteristics of the soil and land in the field. e. describe the morphological characteristics of the soil using a drill and to profile the soil. f. collect soil profile, fertility, and physical samples. g. identify the site and collect water samples. h. plot all observations on a work map.	Field Practicum, Collaborative Work	Field Data, Sample Quality, Final Examination
11.	Students will be able to: a. process the results of field observations (plotting, correlating drill data, profiles), and soil and water samples. b. prepare detailed soil maps, including soil unit classification, relief, slope class, parent material, and other land features.	Group Discussion, Class Discussion, Project Based Learning	Land properties, Land suitability, Land Management Units Maps; Final Report; Final Examination

	c. prepare land use maps and plantation management units. d. evaluate the land suitability of management units for appropriate commodities. e. prepare land management recommendations based on the limiting factors in each land management unit.		
12.	Students will be able to: a. Able to prepare presentation materials for land survey results. b. Able to present the results of land surveys and land evaluations.	Class Discussion, Project Based Learning	-

E. Module contents

Topic	Number of Week(s)	Contact Hours
1. Previous land survey reports, covering land surveys at various survey levels/scales, with a range of characteristics in the survey areas. 2. Three types of reports/regions.	**1**	
Work framework, Land Survey Proposal, and Land Evaluation: Land Survey and Land Evaluation Project.	1	
1. Map of the IPB Sukamantri plantation area, RBI map, DEMNAS, satellite imagery, geological map, and climate data. 2. Land characteristics survey methods: a. Land mapping b. Land cover mapping (SNI), etc.	1	
1. Map of the IPB Sukamantri plantation area, RBI map, DEMNAS, satellite imagery, geological map, and climate data for the project area. 2. Draft work map, supporting maps, and climate data.	1	
1. Work map draft 2. Land survey and land evaluation project draft proposal	1	
1. Land survey and land evaluation proposal draft 2. Presentation	1	
1. Land survey materials and equipment. 2. Work map and supporting maps 3. Digital work map file.	1	
1. Drones 2. Theodolite	2	

3. The Use of Mobile Phones and Software for Survey		
1. Digital data obtained from drone acquisition 2. Terrestrial data obtained from theodolite acquisition 3. The Use of Laptops and Software for the Project	1	
1. Land survey work map and land evaluation 2. Survey materials and equipment 3. Survey Preparation: Choosing accommodation (spacious rooms, camp, food, and team mobility)	2	
1. Usage map: detailed land map of plantation management units and commodities 2. Existing conditions of growth and productivity of commodities in the management unit 3. Detailed land map 4. Current land suitability map	1	
Final Project Presentation	1	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Soil Research Institute. (1969). Guidelines for Soil Observations in the Field. LPT No. 4/1969.
2. Ritung, S., Nugroho, K., Mulyani, A., & Suryani, E. (2012). Technical Guidelines for Land Evaluation for Agricultural Commodities. Agricultural Research and Development, Bogor.
3. Staff Survey Soil. (1999). Soil Taxonomy: A Basic System of Soil Classification for Making and Interpreting Soil Surveys (2nd ed.). NRCC, USDA, Handbook 436. U.S. Government Printing Office, Washington, D.C.
4. Staff Survey Soil. (2014). Keys to Soil Taxonomy (12th ed.). USDA, Natural Resources Conservation Service.

Journal articles:

b)

Others:

- FAO. (2006). A Framework for Land Evaluation. FAO Soils Bulletin No. 32. Rome, 72 pp. and ILRI Publication No. 22. Wageningen.
- Regulation of the Minister of Environment and Forestry P.14/MENLHK/SETJEN/KUM.1/2/2017 concerning Procedures for Inventory and Determining Functions of Peat Ecosystems and Guidelines for Procedures for Implementing Inventories of Peat Ecosystem Characteristics.
- SNI 7645:2010. Land Cover Classification. National Standardization Agency.
- SNI 7925:2019. Peatland Mapping Standards. National Standardization Agency.
- USDA. (1951). Soil Survey Manual. USDA Handbook No. 18.
- USDA. (2003). Soil Survey Manual. University Press of the Pacific.

MSL1405: Field Study of Land Resources

A. Module Identity

1	Course Name	Field Study of Land Resources
2	Course Code	MSL1405
3	Credit	
4	Semester	6
5	Pre-requisite	
6	Coordinator	
7	Lecturers	Boedi Tjahjono, Wahyu Purwakusuma, Untung Sudadi, Dwi Putro Tejo Baskoro, Hermanu Widjaja, Fahrizal Hazra, Vely Brian Rosandi, Wahyu Iskandar
8	Language	Bahasa Indonesia
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To participate in an excursion to various areas representing diverse land resource characteristics and management practices, focusing on aspects of land management and land use development.
2. To prepare a synopsis highlighting the diversity of land characteristics and management practices.
3. To conduct a Quick Assessment of the productivity and sustainability of current land use and utilization.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to prepare a synopsis highlighting the diversity of land characteristics and management practices.	Group Discussion	Presentation
2.	Students will be able to participate in an excursion to various areas representing diverse land resource characteristics and management practices, focusing on aspects of land management and land use development.	Field Study	Project
3.	Students will be able to conduct a Quick Assessment of the productivity and sustainability of current land use and utilization.		Quiz

E. Module contents

Topic	Number of Week(s)	Contact Hours
Synopsis	**10**	
Excursion	**5**	
Quick Assessment	**1**	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Class Participation		20%
2.	Project (Report, Presentation)		80%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1. Soepardi, G. (1983). **Soil Properties and Characteristics**.
2. Hardjowigeno, S., & Widiatmaka. (2007). **Evaluation of Land Suitability and Land Use Planning**.
3. Rayes, M. L. (2000). **The Characteristics, Genesis, and Classification of Paddy Fields Originating from Merapi Volcanic Material**.

4. Hardjowigeno, S. (1985). **Soil Classification, Land Survey, and Land Capability Evaluation**. Soil Department, Faculty of Agriculture, IPB, Bogor.
5. Sulaeman, Y. (2012). **Development of a Soil-Landscape Model to Predict the Distribution of Soil Properties in Tropical Regions (Case Study on Java Island)**.
6. Arsyad, S. (2009). **Soil and Water Conservation**. PT Publisher IPB Press.

Journal articles:

c)

Others:

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MSL1406: Best Management Practice of Tropical Land

A. Module Identity

1	Course Name	Best Management Practice of Tropical Land
2	Course Code	MSL1406
3	Credit	3 (2-1)
4	Semester	6
5	Pre-requisite	
6	Coordinator	Heru Bagus Pulunggono
7	Lecturers	Untung Sudadi, Widiatmaka, Iskandar, Enny Dwi Wahjunie
8	Language	Bahasa Indonesia
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To identify and solve land use and management problems (both dry land and wetland) sustainably through sound and appropriate land management principles based on scientific theories, local knowledge, and practical aspects in the field, in accordance with local community understanding (local technology).
2. To analyse and identify the main criteria for sustainable land management.
3. To manage land and plan land use effectively.
4. To determine appropriate actions for land management.
5. To manage activities within the scope of their work, demonstrating honesty and responsibility, cooperation, openness, loyalty, and high integrity in carrying out their tasks.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to know and understand the concept of land use and management (both dry land and wetland) in a sustainable manner. This understanding will be achieved through the application of sound and appropriate land management principles based on scientific theories, local knowledge, and practical aspects in the field, in accordance with local technology and wisdom.	Lecture, Class Discussion, Practicum	Written Test, Report (Assignment and Practicum)

E. Module contents

Topic	Number of Week(s)	Contact Hours
Scope of Land Management Aspects: a. Understanding land management in relation to land as a resource b. Potential land for agriculture and its distribution c. Land quality, socio-cultural aspects, and sustainable land use	**1**	**2**
Land/Land Use Strategy for Agricultural Businesses a. Aims and objectives of land management for agriculture b. The value and functions of land c. Effective and appropriate land management strategies and models	**1**	**2**
Land Capability, Land Suitability, and Land Use Management a. Understanding land capability, land suitability, and land use management b. Factors that influence land capability and suitability c. Factors that influence land use (land use competition and regulations) d. Land use planning	**1**	**2**
Land Use in Relation to Land Degradation a. Understanding land degradation and the factors that influence it b. Forms of land degradation c. Soil degradation and its impact on the environment (biophysical, social, and economic) and crop production d. Management (prevention and remediation) of degraded land	**1**	**2**
Development and Utilization of Land Based on Land Capabilities and Suitability	**1**	**2**

a. Land use planning based on a conservation approach b. Land development for cultivation areas c. Land development for non-cultivation areas d. Land use patterns		
Critical Land (Degraded Land) and Factors That Influence Its Emergence a. Definition of critical land b. Critical soils (several examples) c. Factors that influence the emergence of critical land d. Changes in the function/use of critical land and its management	**1**	**2**
Causes of Critical Land a. Description of the causes of critical land b. The function of vegetation in relation to critical land c. Overcoming the causes of critical land through post-mining land rehabilitation, restoration, and reclamation	**1**	**2**
Post-Open Mining Land a. Stages: rehabilitation, reclamation, and revegetation b. Mainland alluvial mines c. Conditions and typology of post-tin mining land d. Soil properties of post-tin mining land e. Contextual reclamation	**1**	**2**
Post-mining Land Cover and Land Reclamation Plan #1	**1**	**2**
Post-mining Land Cover and Land Reclamation Plan #2	**1**	**2**
Water-Soil-Nutrient-Plant Relationships and Management **Plant Water and Nutrient Cycles** a. Factors that influence the availability of water and nutrients b. The functions of water and nutrients for plant growth c. Management of water and nutrients for agricultural practices	**1**	**2**
Dry Land Management for Agriculture a. Characteristics of challenges in upland and dryland areas for agricultural practices b. Dryland management strategies for agriculture	**1**	**2**
Sustainable Farming Systems on Dry Land a. Understanding agricultural businesses b. Types of agricultural/plant cultivation businesses, such as: slash-and-burn farming, moorlands, gardens, mixed farming, rice fields, plantations, and agroforestry c. Agricultural practices and land conservation d. Agricultural practices in relation to land characteristics and quality	**1**	**2**
Soils and Wetland Management a. Definition of wetlands b. Physical and chemical properties of wetlands c. Swamplands and flood-prone areas	**1**	**2**

d. Land use in wetlands e. Wetland management techniques for agricultural businesses		

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Mid Term Examination		25%
2.	Final Examination		25%
3.	Practicum (Assignment, Report, Presentation)	Week 1 – Week 14	50%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Textbooks:

1.

Journal articles:

d)

Others:

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SEMESTER 8

MSL1490: Seminar

A. Module Identity

1	Course Name	Seminar
2	Course Code	MSL1490
3	Credit	
4	Semester	8
5	Pre-requisite	
6	Coordinator	
7	Lecturers	
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To formulate research results and compile them into scientific papers that will be presented at seminars.
2. To conduct data analysis relevant to the research objectives.
3. To review research results based on literature searches, enabling them to develop arguments and discussions.
4. To formulate research conclusions and suggestions.
5. To prepare PowerPoint presentations for seminars on research results.
6. To present research results both orally and through posters.
7. To respond quickly and accurately, demonstrating good reasoning skills and discipline.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to compile the results of their research into a scientific report in the form of a seminar paper.	Discussion/Consultation with Supervisors	Data tabulation, Systematics of writing seminar papers, Seminar paper
2.	Students will be able to explain the results of their research	Discussion/Consultation with Supervisors	Seminar papers, Presentations at scientific forums (oral or through posters)

E. Module contents

Topic	Number of Week(s)	Contact Hours
1. Communication 2. Techniques for presenting research results	7	
1. Communication 2. Techniques for submitting research to scientific forums	7	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Participatory activities (answering questions/discussion)		30%
2.	Project results (seminar papers, posters)		40%
3.	Assignments (compiling papers)		30%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Others:

- 4th Edition Revision Team. 2019. Guidelines for writing students' final scientific papers, 4th edition. IPB University, IPB Press.

MSL1491: Undergraduate Thesis

A. Module Identity

1	Course Name	Undergraduate Thesis
2	Course Code	MSL1491
3	Credit	
4	Semester	8
5	Pre-requisite	
6	Coordinator	
7	Lecturers	
8	Language	Indonesian
9	Program(s) in which the course is offered	Internal department: Land Resource Management
10	Type of teaching	a. Traditional classroom: 0% b. Blended system: Traditional classroom 40- 80%, Online 0-40% c. e-Learning system: 20% d. Others: 0%

B. Workloads (total contact hours and credits per semester)

Credit		Contact				Self-study	Other	Total
SKS	ECTS	Lecture	Exercise	Laboratory	Practice			

**) Semester credit unit according to the Indonesian higher educational system*
1 credit unit lecture = 2 hours/week for lecture and 2 hours/ week for self-study within 14 weeks/ semester 1 credit unit class exercise or laboratory or field practice = 3 hours/week within 12-14 weeks/semester

***) 1 hour for lecture= 50 minutes; 1 hour for class exercise or laboratory or field practice = 60 minutes*

C. Module objectives (learning outcomes, LO)

Students will be able:

1. To collect data, check and edit data, enter data, and process data.
2. To create an archive of all relevant data.
3. To formulate research results and compile them into scientific papers that will be presented at seminars.
4. To conduct data analysis relevant to the research objectives.
5. To review research results based on literature searches, enabling them to develop arguments and discussions.
6. To formulate research conclusions and suggestions.
7. To prepare PowerPoint presentations on research results for seminars.
8. To present research results both orally and through posters.
9. To respond quickly and accurately, demonstrating good reasoning skills and discipline.
10. To take responsibility for research results based on theoretical foundations and previous research.

D. Detailed learning outcomes in relation to learning domains, teaching strategies and assessment methods

No	LO in Learning Domains	Teaching Strategies	Assessment Methods
1.	Students will be able to conduct research both in the laboratory and in the field.	Discussion/Consultation with Supervisor	Research activities, Data tabulation, Data analysis
2.	Students will be able to explain the results of their research and present them in a thesis draft.	Discussion/Consultation with Supervisor	Systematics of thesis writing, Thesis Draft, Presentations and questions and answers during the thesis exam

E. Module contents

Topic	Number of Week(s)	Contact Hours
1. Communication 2. Data collection techniques for presenting research results	**7**	
1. Communication 2. Techniques for presenting research data 3. Question and answer	**7**	

F. Course Assessment

No	Assessment Type	Schedule (Week Due)	Proportion to the Final Mark
1.	Participatory activities (research activities)		40%
2.	Project results (thesis draft)		30%
3.	Thesis Exam		30%

*) Example: mid-term examination, final examination, quiz, homework, project, etc.

G. Media Employed

Laptop, LCD, Microphone, White Board, Marker, Pointer

H. Learning Resources

Others:

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