MODULE HANDBOOK

Semester 1

Pancasila UNI 10509

Module Designation	**Pancasila**
Code	UNI 10509
Semester (s) in which the module is taught	1st semester/1st year
Person responsible for the module	1. Dr. Hudaidah, M.Pd 2. Pancasila Teaching Team
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	2 credits (equivalent with 3.00 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-2: Act as citizens who are proud and love their homeland, have nationalism and are responsible for the State and nation. 2. LO-AV-3: Capable of contributing in improving the quality of life in society, nation and state based on Pancasila. 3. LO-AV-6: Respect the diversity of cultures, views, religions, and beliefs, as well as the opinions. General Skill 1. LO-GS-10: Capable of adapting quickly to the world of work and the environment.
Content	1. Introduction to Pancasila Education: the concept and urgency of Pancasila education, the reason for the need for Pancasila education, historical sources, sociological, Pancasila education politics 2. The dynamics and challenges of Pancasila education and the essence and urgency of Pancasila education for the future 3. Pancasila in the Current History of the Indonesian Nation 4. Pancasila as the State Foundation 5. Pancasila as the State Ideology 6. Pancasila as a Philosophical System

MODULE HANDBOOK

	7. Pancasila as a System of Ethics 8. Pancasila as the Basic Value of Science Development 9. The dynamics and challenges of Pancasila as the basis for the value of science development
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works
Media employed	LCD, whiteboard, websites
Reading list	1. Putra, Z., Wajdi, H.F. 2021. Buku Ajar Pendidikan Pancasila dan Kewarganegaraan Panduan Kuliah di Perguruan Tinggi. Ahlimedia Book. 2. Wahono, S., Suajiyo., Malik, D.K. Pendidikan Pancasila untuk Perguruan Tinggi. Akademika. 3. Suharta. 2019. Pancasila. Penerbit Lakeisha.

MODULE HANDBOOK

Indonesian UNI 10315

Module Designation	**Indonesian**
Code	UNI 10509
Semester (s) in which the module is taught	1st semester/1st year
Person responsible for the module	1. Dr. Zahra A., M.Pd. 2. Indonesia Language Teaching Team
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.00hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	2 credits (equivalent with 3.00 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-2: Act as citizens who are proud and love their homeland, have nationalism and are responsible for the State and nation. 2. LO-AV-4: Upholding human values based on morals and ethics. General Skill 1. LO-GS-1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise. 2. LO-GS-4: Capable to compiling a scientific description of the results of the studies mentioned above in the form of a Research Project or final project report, and upload it on the university's website. Specific Skill 1. LO-SS-4: Capable of identifying problems, providing alternative solutions, and making decisions in the cultivation of crops in the agricultural and plantation industrial systems. 1. LO-SS-12: Capable of communicating aspects of plant cultivation in an attractive, efficient, effective and productive manner.

MODULE HANDBOOK

Content	1. History of Indonesian Language Development 2. The position, function, and legal force of the Indonesian language 3. Characteristics of academic texts 4. Academic text structure 5. Spelling and punctuation in academic texts 6. The Nature of Effective Sentences; Characteristics of Effective Sentences; Sentence Structure; Types of Sentences 7. The Nature of Paragraphs; Paragraph Forming Elements; Types of Paragraphs; Requirements for a Good Paragraph; Techniques and Patterns of Paragraph Development 8. Systematics of writing quotes 9. Systematics of writing a bibliography 10. Characteristics of an essay 11. Essay writing structure 12. Essay writing 13. Presentation of the resulting essay writing
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works
Media employed	LCD, whiteboard, websites
Reading list	1. Rokhmansyah, A., Rijal, S., Puwanti. 2018. Bahasa Indonesia untuk Perguruan Tinggi. Unnes Press. 2. Awaluddin. 2017. Pengantar Bahasa Indonesia untuk Perguruan Tinggi. Deepublish. 3. Mukodas. 2020. Bahasa Indonesia Cendekia Mata Kuliah Wajib Umum Bahasa Indonesia. Penerbit Lindan Bestari.

MODULE HANDBOOK

Mathematics PER 11516

Module Designation	**Mathematics**
Code	PER 11516
Semester (s) in which the module is taught	1st semester/1st year
Person responsible for the module	1. Dr. Ir. Herlina Hanum, M.Si. 2. Mathematic Team Teaching
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 35.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 35.00 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 4.43 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-1: Mastering the theoretical concepts and being able to develop science and technology for the cultivation of food crops, plantations and horticulture based on local wisdom and resources. General Skill 1. LO-GS-1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise.
Content	1. Real numeral system; Rational and irrational numbers; Operations on real numbers; Characteristic of Field. 2. Inequality; Absolute value; square root; square. 3. Quadrilateral coordinate system, point distance, straight line, slope of line. 4. The point of intersection of the curve; Draw an equation graph. 5. Definition of function; Drawing function; Sum operation and multiplication, Composition of functions and trigonometric functions.

MODULE HANDBOOK

	6. Definition of limit; limit theorem; Continuity of function. 7. Definition of derivative through limit; derivate search rules; derivate sinus and cosines. 8. Leibniz Writing chain rule; High-level derivative. 9. Maximum-minimum function; monotony; Concavity 10. Integral concept; Integral determination rule. 11. Integral of composition function (Replacement method) 12. Area of flat area. 13. Ordo matrix; Transpose, summation, multiplication; Determinant; join, dan cofactor Invers matrix. 14. System linear of equations; Form matrix from System linear of equations; Solution System linear of equations; Notation sigma $\boldsymbol{\Sigma}$.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works
Media employed	LCD, whiteboard, websites
Reading list	1. Mulyadi, S.R., Patty, E.N.S., Ama, H.M., Anggraeni, D.M. 2020. Buku Matrikulasi Matematika Dasar untuk Tingkat Perguruan Tinggi. uwais inspirasi Indonesia. 2. Jumini, S. 2017. Buku Ajar Matematika Dasar Untuk Perguruan Tinggi. Penerbit Mangku Bumi. 3. Suryanti, S., Zawawi, I. 2020. Pengantar Dasar Matematika. Deepublish.

MODULE HANDBOOK

Agrochemicals PAG 101116

Module Designation	**Agrochemicals**
Code	PAG 11115
Semester (s) in which the module is taught	1st semester/1st year
Person responsible for the module	1. Prof. Dr. Ir. Rujito Agus Suwignyo, M.Agr. 2. Dr. Susilawati, S.P., M.Sc. 3. Dr. Ir. Mery Hasmeda, M.Sc. 4. Fitra Gustiar, S.P., M.Si. 5. Dr. Irmawati, S.P., M.Si., M.Sc. 6. Dr. Fikri Adriansyah, S.Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-1: Mastering the theoretical concepts and being able to develop science and technology for the cultivation of food crops, plantations and horticulture based on local wisdom and resources. General Skill 1. LO-GS-1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise.
Content	1. Introduction of agrochemical. 2. Atomic structure and electron configuration. 3. Chemical bond. 4. Nutrients and types of fertilizers. 5. Structure and function of water.

MODULE HANDBOOK

	6. Organic chemistry: nomenclature of organic compounds & functional groups. 7. Acid, alkaline and salt. 8. pH, solution and indicator. 9. Structure and function of lipid and lipid acids. 10. Structure and function of carbohydrate and protein. 11. Concentration, ppm, %, molar concept, molarity, normality. 12. Hydroponic nutrient solution media and tissue culture. 13. Soil, nutrients and fertilization. 14. Pesticides and applications.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media Employed	Quiz, Mid-terms and Final Examination
Reading list	1. Mido Y. and M. Satake. 1994. Chemistry for Agriculture and Ecology. Discovery Publishing House. 2. Timberlake, K.C. and W. Timberlake. 2014. Basic Chemistry. Pearson Education. 3. Roberts, T.R. 2000. Metabolism of Agrochemicals in Plants. John Willey and Sons. 4. Mansyur, N.I., E.H. Pudjiwati, A. Murtilaksono. 2021. Pupuk dan Pemupukan. Syiah Kuala University Press. 5. Anac, D., Matin-Prevel, P. 1999. Improved Crop Quality by Nutrient Management. Kluwer Academic Publishers. 6. Michael, F, Waxman. 1998. Agrochemical and Pesticide Safety Handbook. CRC Press. 7. Fageria, N.K. 2014. Nitrogen Management in Crop Production CRC Press. 8. Knowles, D.A. 1998. Chemistry and Technology of Agrochemical Formulations. Springer Dordrecht. 9. Prasad, M.N.V. 2020. Agrochemicals Detection, Treatment and Remediation. Elsevier. 10. Plimmer, J.R., Gammon, D., Nancy, N., Ragsdale. 2002. Encyclopedia of Agrochemicals. Wiley Online Library. 11. Cremlyn, R.J.W. 1991. Agrochemicals: Preparation and Mode of Action. Wiley; 2nd edition. 12. Goodwin., Mercer. 1988. Introduction to Plant Biochemistry. Pergamon Press. 13. Prasad, M.N.V., Strzalka, K. 2002. Physioloy and Biochemistry of Metal Toxicity and Tolerance in Plants. Kluwer Academic Publishers. 14. Khan, N.A. 2006. Ethylene Action in Plants. Springer. 15. Research publications related to research agrochemicals.

MODULE HANDBOOK

Introduction to Agricultural Science PER 11215

Module Designation	**Introduction to Agricultural Science**
Code	PER 11215
Semester (s) in which the module is taught	1st semester/1st year
Person responsible for the module	1. Prof. Dr. Ir. Benyamin Lakitan, M.Sc. 2. Dr. Ir. Zaidan Panji Negara, M.Sc. 3. Dr. Ir. Firdaus Sulaiman, M. Si. 4. Dr. Ir. Erizal Sodikin
Language	Indonesian.
Relation to curriculum	Compulsory Course.
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	2 credits (equivalent with 3.00 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-3: Mastering the theoretical concepts of sustainable and environmentally friendly plant cultivation management. General Skill 1. LO-GS-1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise.
Content	1. Introduction, the scope and development of agriculture. 2. History and development of agriculture. 3. Progress and pioneers in agriculture. 4. Major issues in the agricultural sector. 5. Agriculture as a sub-sector of national development. 6. The role of science and technology in agriculture. 7. Development of agribusiness and agro-industry in increasing people's income. 8. Food security and food security issues.

MODULE HANDBOOK

	9. Natural resources. 10. The environment in relation to agricultural activities. 11. Free trade. 12. Law and policy in agriculture.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Writing Case Paper 3. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Murphy, D.J. 1992. Safety and Health for Production Agriculture. ASAE. 2. Webster, C.C., Wilson, P.N. 1998. Agriculture in the Tropics Third Edition. Blackwell Science 3. Spedding, C.R.W. 1988. An Introduction to Agricultural Systems. Springer. 4. Sheaffer, C.C., Kristine., Moncada, M. 2011. Introduction to Agronomy. Cengage Learning. 5. Lee, J.S., Turner, D.L. 1997. Introduction to World Agri science and Technology. Interstate Publisher, Inc. 6. Chandrasekaran, B., Annadurai, K., Somasundaram. 2010. A Textbook of Agronomy. New Age International Publishers New Delhi. 7. Pareek, A., Sopory, S.K., Bohnert, H.J., Govindjee. 2010. Abiotic Stress in Plants. Springer, Dordrecht, Nederland.

MODULE HANDBOOK

Introduction to Agriculture Economics ABI 11216

Module Designation	**Introduction to Agriculture Economics**
Code	ABI 11216
Semester (s) in which the module is taught	1st semester/1st year
Person responsible for the module	1. Prof. Dr. Ir. Andy Mulyana, M.Si. 2. Dr. Agustina Bidarti, S.P., M.Si. 3. Dr. Erni Purbiyanti, S.P., M.Si. 4. Eka Mulyana, S.P., M.Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-5: Respecting the diversity of cultures, views, beliefs, and religions and the original opinions/findings of others. 2. LO-AV-11: Students able to understand the latest issues in the field of agribusiness both at the basic level and at the advanced level. General Skill 1. LO-GS-7: Students able to understand knowledge and technology in the field of agribusiness including the development of professional practices through research studies to produce innovative work in the field of agribusiness tested. Specific Skill 1. LO-SS-7**:** Able to plan, implement and evaluate the allocation of natural, human, capital, and social resources to improve the operating efficiency of the agribusiness system, as well as being able to operate and develop innovative, accountable agribusiness business units, create added value by prioritizing socio-economic principles of agriculture and quantitative and qualitative

MODULE HANDBOOK

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

MODULE HANDBOOK

Botany PER 12116

Module Designation	**Botany**
Code	PER 12116
Semester (s) in which the module is taught	1st semester/1st year
Person responsible for the module	1. Dr. Susilawati, S.P., M.Sc. 2. Dr. Ir. Maria Fitriana, M.Sc. 3. Dr. Ir. Marlina, M. Si. 4. Ir. Teguh Achadi, M.P. 5. Dr. Fikri Adriansyah, S.Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 34.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 4.36 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-1: Mastering the theoretical concepts and being able to develop science and technology for the cultivation of food crops, plantations and horticulture based on local wisdom and resources. General Skill 1. LO-GS-1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise.
Content	1. Introduction, Definition, history and theory of cells. 2. Structure, cell organelle and function of plant cells. 3. Cell reproduction. 4. Relationships between cells and tissues. 5. Tissue according to the number of constituent cells, level of development and function.

MODULE HANDBOOK

	6. Anatomy, morphology and function of leaves, stems. 7. Anatomy, morphology and function of roots. 8. Flower organ. 9. Fruit organ. 10. Taxonomy and plant systematics. 11. Plant nomenclature. 12. Plant identification. 13. Plant description.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Elpel, T.J. 2013. Botany in a Day: The Patterns Method of Plant Identification. HOPS Press. 2. Mauseth, J.D. 1991. Botany: An Introduction to Plant Biology. Jones & Bartlett Learning. 3. Pollan, M. 2001. The Botany of Desire: A Plant's-Eye View of the World. Random House Trade Paperbacks. 4. Hodge, G. 2013. Practical Botany for Gardeners: Over 3,000 Botanical Terms Explained and Explored. University of Chicago Press. 5. Pollan, M. 2001. The Botany of Desire: A Plant's-Eye View of the World. Random House Publishing Group. 6. Wohlleben, P. 2015. The Hidden Life of Trees: What They Feel, How They Communicate – Discoveries from a Secret World. Greystone Books. 7. Erskine, W., Muehlbauer, F.J., Sarker, A., Sharma, B. 2009. The Lentil Botany, Production and Uses. Icarda. 8. Heywood, V.H., Brummitt, R.K., Culham, A., Seberg, O. 1978. Flowering Plan Families of the World. Firefly Books.

MODULE HANDBOOK

Agroclimatology PAG 20116

Module Designation	**Agroclimatology**
Code	PAG 20116
Semester (s) in which the module is taught	1st semester/1st year
Person responsible for the module	1. Dr. Ir. Firdaus Sulaiman, M. Si. 2. Dr. Ir. Yakup, M.S. 3. Dr. Ir. Zaidan Panji Negara, M.Sc. 4. Fitra Gustiar, S.P., M.Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Knowledge 1. LO-KC-4: Mastering theoretical concepts in the development of appropriate technology that is applicable in the community to increase agricultural production. General Skill 1. LO-GS-1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise. Specific Skill 1. LO-SS-12: Capable of applying and modifying local wisdom by using the latest science and technology to be applied in plant cultivation practices with specific locations.
Content	1. Scope of agroclimatology. 2. The role of climate for agriculture. 3. Earth's atmosphere. 4. Solar radiation. 5. Air temperature. 6. Temperature and plant growth.

MODULE HANDBOOK

	7. Air Pressure and Wind. 8. Humidity. 9. Hydrological cycle, clouds, and rain. 10. Climate classification. 11. Tropical climate. 12. Climate in Indonesia. 13. Global warming. 14. Climate change. 15. The effect of climate on pests and plant diseases. 16. Adaptation to climate change.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Balasubramanian, T.N., R. Jagannthan and V. Geethalaksmi. 2021. Agro-Climatology, Advances and Challenges. CRC Press. 332 p. 2. Bishnoi, P. 2010. Applied Agroclimatology. Oxford Book Company. 551 p. 3. Bryant, C.R., M.A. Saar and K. Delusca. 2016. Agricultural Adaptation to Climate Change. Springer. 247 p. 4. Das, R. 2017. Climate Variability and Its Impact on Crop Production. Asia Toy and Play Association. 576 p. 5. Ferreira, L.G.B. 2021. Agroclimatology. KS Omniscriptum Publishing. 180 p. 6. Ganesaraja, V., R. Veeraputiran and V.K. Paulpandi. 2011. Agro Climatolog: Principles and Predictions. Associated Publishing Company. 90 p. 7. Hatfield, J.L., M. Sivakumar and J. Prueger. 2020. Agroclimatology: Linking Agriculture to Climate. American Society of Agronomy. Wisconsin, US. 656 p. 8. Lalic, B., J. Eitzinger, A.D. Marta, S. Orlandini, A.F. Sremac and B. Pacher. 2018. Agricultural Meteorology and Climatology. Firenze University Press. 352 p. 9. Mago, P. 2014. Climate Change, Effect and Impact on Agricultural. Anuradha Prakashan. 120 p. 10. Oldemen, L.R. and M. Frere. 1982. Technical Report on a Study of The Agroclimatology of The Humid Tropics of Southeast Asia. Food and Agriculture Organization, UN. 229 p. 11. Sahu, D.D. 2013. Fundamentals of Agricultural Climatology. Agrobios Publishers. Jodhpur, India. 422 p.

12. Wang, Y. 2020. Admosphere and Climate. CRC Press. Boca Raton. 389 p.
13. Research publications related to agroclimatology.

MODULE HANDBOOK

Fundamentals of Management ABI 11116

Module Designation	**Fundamentals of Management**
Code	UNI 10509
Semester (s) in which the module is taught	1st semester/1st year
Person responsible for the module	1. Ir. Fauzia Asyiek, M.A., Ph.D. 2. Dr. Ir. Idham Alamsyah, M.Si. 3. Dr. Ir. Amruzi Minha, M.Si. 4. Ir. Yulius, MM. 5. Dwi Wulan Sari, S.P., M.Si., Ph.D. 6. Henny Malini,S.P., M.Si. 7. Erni Purbiyanti, S.P., M.Si. 8. Muhammad Arby, M.Si. 9. Thirtawati, S.P., M.Si. 10. Elly Rosana, S.P., M.Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	2 credits (equivalent with 3.00 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. 2. LO-AV-9: Capable of internalizing the spirit of independence and struggle (DIKTI). Knowledge 1. LO-KC-3: Mastering the theoretical concepts of sustainable and environmentally friendly plant cultivation management. General Skill 1. LO-GS-2: Capable of demonstrating independent, quality, and measurable performance. Specific Skill 1. LO-SS-4: Capable of identifying problems, providing alternative solutions, and making decisions in the

MODULE HANDBOOK

	cultivation of crops in the agricultural and plantation industrial systems. 2. LO-SS-5: Capable of planning and evaluating efficient and effective crop cultivation systems.
Content	1. Introduction, and Development of Figures of Management. 2. Planning Function. 3. Organization Function. 4. Departmentation. 5. Staff and Committee. 6. Delegation. 7. Acquiring Employees. 8. Advancing Employees. 9. Utilizing Employees. 10. Dismissing Employees. 11. Giving Orders Function. 12. Supervision Function. 13. Human Resource Management. 14. Presentation of The Company's Case Review.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Writing Case Paper 3. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Hasibuan, Malayu. 2001. Management: Basics, Understanding and Problems. Earth Characters. Jakarta Manulang. 1998. 2. Management Basic. Ghalia Indonesia. Jakarta. 3. Rae, Leslie. 1993. 50 Activities to Develop Management Skills. Volume 1. Scripting. Jakarta. 4. Stoner, James. 2001. Management Volumes 1 and 2. Erlngga. Jakarta. Williams, Teresa. 1993. 50 Activities to Develop Management Skills. Volume 2. Scripting. Jakarta. Zandstra, 5. Jack. 1993. 50 Activities to Develop Management Skills. Volume 3. Scripting. Jakarta

MODULE HANDBOOK

Semester 2

Religion UNI 10116

Module Designation	**Religion**
Code	UNI 10116
Semester (s) in which the module is taught	2nd semester/1st year
Person responsible for the module	1. Dr. Nurhasan, M.Ag. 2. Religion Teaching Team
Language	Indonesian
Type of teaching	Lecture, practical, and project
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	2 credits (equivalent with 3.00 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-1: Faithful to God Almighty and capable of actualizing a religious attitude. 2. LO-AV-6: Respect the diversity of cultures, views, religions, and beliefs, as well as the opinions.
Content	1. Introduction to Religious education. 2. The Concept of God in Islam. 3. The concept of faith and piety. 4. Implementation of Faith and Taqwa in modern life. 5. Human nature according to Islam. 6. Law, HAM, and Democracy in Islam. 7. Islamic Law, Contribution of Muslims in Indonesia. 8. Moral and Moral Ethics. 9. Science and technology and art in Islam. 10. Inter-religious harmony. 11. Civil Society. 12. Islamic Economics. 13. The concept of Islamic culture. 14. Islamic political concept.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works

Media employed	LCD, whiteboard, websites
Reading list	1. Dikti. 2016. Pendidikan Agama Islam Untuk Perguruan Tinggi. Dikti. 2. Rustam, R., Haris, Z.A. Buku Ajar Pendidikan Agama Islam Di Perguruan Tinggi. Omega. 3. Amin, R. 2015. Sistem Pembelajaran Pendidikan Agama Islam pada Perguruan Tinggi Umum. Deepublish.

MODULE HANDBOOK

English UNI 10416

Module Designation	**English**
Code	UNI 10416
Semester (s) in which the module is taught	2nd semester/1st year
Person responsible for the module	English Teaching Team
Language	Indonesian
Type of teaching	Lecture, practical, and project
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	2 credits (equivalent with 3.00 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-4: Upholding human values based on morals and ethics. General Skill 1. LO-GS-1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise. 2. LO-GS-4: Capable to compiling a scientific description of the results of the studies mentioned above in the form of a Research Project or final project report, and upload it on the university's website. Specific Skill 1. LO-SS-4: Capable of identifying problems, providing alternative solutions, and making decisions in the cultivation of crops in the agricultural and plantation industrial systems. 2. LO-SS-12: Capable of communicating aspects of plant cultivation in an attractive, efficient, effective and productive manner.
Content	1. Vocabulary in English. 2. Grammar and sentences in English.

	3. Mastery of the meaning of words and sentences in English. 4. Mastery of translating English to Indonesian in the agricultural sector. 5. The use and disclosure of words and sentences in write well and correctly. 6. The use and disclosure of words and sentences in good and correct speech. 7. Mastery of the ability to communicate using English.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works
Media employed	LCD, whiteboard, websites
Reading list	1. Hutchinson, T. 2007. English for Life: Pre-intermediate. Student's book. Oxford University Press. 2. Susesno, E. 2019. Bahasa Inggris untuk Pemula Metode Komik. Deepublish. 3. Priyasudiarja, Y. 2016. English for Presentation and Public Speaking. Al-Mizan.

MODULE HANDBOOK

Genetics PAG 108116

Module Designation	**Genetics**
Code	PAG 108116
Semester (s) in which the module is taught	2nd semester/1st year
Person responsible for the module	1. Dr. Ir. Mery Hasmeda, M.Sc. 2. Dr. Ir. E. S. Halimi, M.Sc. 3. Dr. Ir. Dwi Putro Priadi, M.Sc. 4. Dr. Ir. Andi Wijaya, M.Agr.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 48.00 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-5: Mastering the theoretical concepts of the latest science and technology development in plant cultivation that can be applied to the community. General Skill 1. LO-GS-1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise. Specific Skill 1. LO-SS-2: Capable of applying and modifying local wisdom by using the latest science and technology to be applied in plant cultivation practices with specific locations.
Content	1. Introduction: Scope of genetic and history of genetic development

	2. Inheritance and diversity of traits: a. Mendel Principle, b. Segregation on Generation, c. Dominance Patterns, d. Epistasis. 3. Probability theory: a. Principles of Probability, b. genetic count 4. Inheritance through the Cytoplasm: a. Inheritance Character through Cytoplasm, b. Inheritance on Organelle Cell, c. Male infertile and Maternal Effect. 5. Chromosome as gene carrying: a. Consistency Number of Chromosome, b. Mitosis and Meiosis c. Chromosome as Sex Determinant. 6. Diversity of number and structure of chromosome: a. Chromosome Shape, b. Polyploidy, c. Aneuploidy, d. Chromosome Aberration. 7. Mutation and mutagenesis: a. Biochemistry of Mutation, b. Spontaneous of Mutation, c. Induced Mutation. 8. Linkage and chromosome mapping: a. Gene Location on Chromosome and Recommendation. B. Cross Over. 9. Gene expression: a. Relationship between Gene and polypeptide, b. Transcription, c. Genetic Code. 10. Structure and DNA replication: a. Chemical Structure of DNA, b. Physical Structure of DNA, c. Synthesis and Replication of DNA. 11. Population of genetic: a. Allele Frequency and Genotype Frequency, b. Cross system, c, Principles of Hardy-Weinberg, d. Inbreeding. 12. Genetic quantitative and evolution: a. Quantitative Inheritance, b. Variances, c. Heritability. 13. Germplasm and plant genetic Improvement. 14. Germplasm and plant genetic Improvement.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works
Media employed	LCD, whiteboard, websites
Reading list	1. Mukherjee, S. 2017. The Gene: An Intimate History. Large Print Press. 2. Varshney, R.K., Chitikineni, A., Pandey, M.K. 2018. Plant Genetics and Molecular Biology. Springer. 3. Arencibia, A.D. 2000. Plant Genetic Engineering: Towards the Third Millennium. Elsevier Science. 4. Grotewold, E., Chappell, J., Kellogg, E.A. 2015. Plant Genes, Genomes and Genetics. Wiley Online Books. 5. Graner, A., Tuberosa, R., Frison, E. 2013. Genomics of Plant Genetic Resources: Volume 1. Managing, sequencing and mining genetic resources. Springer.

	6. Falconer, D.S. 1986. Introduction to Quantitative Genetics Secon Edition. Longman Scientific & Technical. 7. Murphy, D.J. 2007. People, Plants and Genes. Oxford Press. 8. Simpson, S. 2008. Plant Genetics and Genomics: Crops and Models. Springer. 9. Suarez, M.F., Bozhkov. 2008. Plant Embryogenesis. Humana Press. 10. Research publications related to genetics.

MODULE HANDBOOK

Fundamentals of Plant Physiology PAG 109116

Module Designation	**Fundamentals of Plant Physiology**
Code	PAG 109116
Semester (s) in which the module is taught	2nd semester/1st year
Person responsible for the module	1. Prof. Dr. Ir. Rujito Agus Suwignyo, M.Agr. 2. Dr. Susilawati, S.P., M.Si. 3. Dr. Irmawati, S.P., M. Si., M.Sc. 4. Dr. Ir. Lidwina Niniek S., M.Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	5. Lectures (explanation, discussion) 6. Structured assignment (i.e.: article reading and review) 7. The class size 30-75 students per class 8. Contact hours for lecture are 23.33 hours per semester 9. Total hours practical is 34.00 hours per semester
Workload (incl. Contact hours, self-study hours)	4. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 5. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 6. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 4.36 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-2: Mastering the theoretical concepts of plant cultivation problems and being able to manage and solve problems in the field. General Skill 1. LO-GS-1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise. Specific Skill 1. LO-SS-1: Capable of applying plant cultivation in agricultural systems by utilizing biological resources creatively and innovatively.
Content	1. Introduction, basic concept of the lecture. 2. Water properties and its translocation. 3. Plant and water relationship. 4. Transpiration 1.

MODULE HANDBOOK

	5. Transpiration 2. 6. Mineral nutrients 1. 7. Mineral nutrients 2. 8. Plant growth regulator. 9. Plant enzyme. 10. Photosynthesis 1. 11. Photosynthesis 2. 12. Respiration 1. 13. Respiration 2. 14. Plant growth and development.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Angus, S.M., E. Zeiger., and I.M. Meller (eds.). 2018. Plant Physiology and development. Oxford University Press, London, UK. 2. Lakitan, B. 2018. Dasar-Dasar Fisiologi Tumbuhan. Cetakan ke 14. Rajawali Press. Jakarta. INA. 3. Jain, V.K. 2017. Fundamentals of plant physiology. Schand and Company limited. New Delhi. IND. 4. Manju, M. 2021. Plant Physiology. Horizon Books. A Division of Ignited Minds Edutech P Ltd. New Delhi, IND. 5. Pessarakli, M (Ed.). 2014. Handbook of Plant and Crop Physiology. 3rd Edition. CRC Pres. Taylor and Francis Group. New York. USA. 6. Salisbury, F.B. 1992. Plant Physiology. Thomson Press Ltd. New Delhi. IND. 7. VK Jain. 2017. Fundamentals of Plant Physiology. Schand. 8. Lambers, H., Chapin III, F.S. 2008. Plant Physiological Ecology. Springer. 9. Stewart, P., Globig, S. 2012. Plant Physiology. Apple Academic Press. 10. William, G.H., Norman., Honer, P.A. 2011. Introduction to Plant Physiology 11. Nobel, P. 2009. Physicochemical and Environmental Plant Physiology. Elsevier. 12. Scott, P. 2008. Physiology and Behavior of Plants. Wiley. 13. Research publications related to plant physiology.

MODULE HANDBOOK

Fundamentals of Agronomy PAG 202116

Module Designation	**Fundamentals of Agronomy**
Code	PAG 202116
Semester (s) in which the module is taught	2nd semester/1st year
Person responsible for the module	1. Dr. Ir. Yakup, M.S. 2. Dr. Ir. Firdaus Sulaiman, M.Si. 3. Dr. Ir. Zaidan Panji Negara, M.Sc. 4. Fitra Gustiar, S.P., M.Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 34.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 4.36 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Knowledge 1. LO-KC-4: Mastering theoretical concepts in the development of appropriate technology that is applicable in the community to increase agricultural production. General Skill 1. LO-GS-1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise. Specific Skill 1. LO-SS-2: Capable of applying and modifying local wisdom by using the latest science and technology to be applied in plant cultivation practices with specific locations.
Content	1. Basic definitions and scopes of agronomy. 2. Agricultural development and the role of agronomy. 3. Areas of origin and centers of crop production. 4. Agronomic plant grouping and examples. 5. Plant growth and development.

MODULE HANDBOOK

	6. Effect of abiotic factors on plant growth and development. 7. Effect of biotic factors on plant growth and development. 8. Grouping and roles of growth regulator substances (GRS), enzymes, and vitamins. 9. Plant breeding. 10. Plant propagation (sexual and asexual), and tissue culture. 11. Preparation of dry land, swamp land, and micro land. 12. Nurseries, seeding, and planting. 13. Cropping patterns and crop diversification. 14. Agricultural intensification, and agricultural extensification. 15. Sustainability of land resources/conservation, and utilization of agricultural waste. 16. Agricultural production facilities.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Arya, R. L. 2020. Fundamentals of Agronomy. Scientific Publishers. 171 p. 2. Ankerman, D. And R. Large. 2007. Agronomy Handbook. Midwest Laboratories, Inc. Omaha 135 p. 3. Djafar, Z.R., Dartius, Ardi, D. Suryati, E. Yuliadi, Hadiyono, Y. Sjofian. M. Aswad dan S. Sagiman. 1990. Dasar-Dasar Agronomi. Western Universities Agricultural Education (WUAE) Project . Palembang 4. Chandrasekaran, B., K. Annadurai and E. Somasundaram. 2010. A Textbook of Agronomy. New Age International (P) Limited Publishers. New Delhi. 835 p. 5. Dris, R., I. A. Khan and R. Niskanen. 2002. Environmental and Crop Production. CRC Press. 360 p. 6. Gopal, C. D. 2019. Fundamentals of Agronomy. Oxford and IBH Publishers, 2nd edition. 444 p. 7. Harjadi, M.M.S.S. 2019. Dasar-Dasar Agronomi. Gramedia Pustaka Utama. Jakarta. 300 h. 8. Hartman, H.T., D.E.Kester, F.T. Davies and R.L. Geneve. 1997. Plant Propagation, Principles and Practices. 6th Edition. Prentice Hall, Englewood Cliffs.

9. Jenkins, A. 2016. Agronomy and Crop Production. Syrawood Publishing House. 205 p.
10. Jones Jr, J. B. 2002. Agronomic Handbook, Management of Crops, Soils and Their Fertility. CRC Press. 450 p.
11. Jumin, H.B. 2005. Dasar-Dasar Agronomi. PT Raja Grafindo Persada. Jakarta. 250 h.
12. Kuswanto, H. 1996. Dasar-Dasar Teknologi Produksi Tanaman Pangan. Penerbit Andi. Yogyakarta.
13. Rai, I.N. 2018. Dasar-Dasar Agronomi. Penerbit Pelawa Sari. Denpasar. 265 h.
14. Shiddieq, D., P. Sudiro dan Tohari. 2020. Aspek Dasar Agronomi Berkelanjutan. Gadjah Mada University Press. Yogyakarta. 400 h.
15. Sitompul, S.M. dan B. Guritno. 1995. Analisis Pertumbuhan Tanaman. Gadjah Mada University Press. Yogyakarta. 412 h.
16. Sugito, Y. 1994. Dasar-Dasar Agronomi. Fakultas Pertanian Universitas Brawijaya. Malang.
17. Kamburova, V. J. and S. K. Kim. 2018. Fundamentals of Agronomy. Scitus Academic LLC. 370 p.
18. Parashar, A. and M. K. Bishnoi. 2021. Fundamentals of Agronomy and Agricultural Meteorology. Bhavya Books. 200 p.
19. Sharanappa. 2021. Fundamentals of Agronomy. New India Publishing Agency-Nipa. 164 p.
20. Singh, S.S. and R. Singh. 2015. Principles and Practices of Agronomy. Kalyani Publishers. 348 p.
21. Sparks, D. L. 2021. Advances in Agronomy, Volume 167. Academic Press. 320 p.
22. Webster, C. C. and P. N. Wilson. 1998. Agriculture in The Tropics. Wiley-Blackwell, 3rd edition. 552 p.

MODULE HANDBOOK

Fundamentals of Soil Science PTN 10116

Module Designation	**Fundamentals of Soil Science**
Code	PTN 10116
Semester (s) in which the module is taught	2nd semester/1st year
Person responsible for the module	1. Prof. Dr. Ir. Dedik Budianta, MS. 2. Dr. Ir. Warsito, MS. 3. Dra. Dwi Probowati Sulistyani, MS. 4. Ir, Marsi, MSc, Ph.D. 5. Dr. Ir. Satria Jaya Priatna, MS. 6. Dr. Ir. A. Napoleon, MP. 7. Dr. Ir. Dwi Setyawan, M.Sc. 8. Dr. Ir. Bambang Prayitno, M.Sc. 9. Dr. Ir. Agus Hermawan, MS. 10. Dr. Ir. Bakri, MS. 11. Prof. Dr. Ir. Edi Armanto, MS. 12. Prof. Dr. Ir. Nuni Gofar, MS. 13. Dr. Ir. Madjid Rohim, MS. 14. Dr. Ir. Momon Imanuddin, MS. 14. Ir. Sabarudin, MSc. Ph.D 15. Ir. Siti Nurul Aidil Fitri, MS.
Language	Indonesian
Type of teaching	Lecture, practical, and project
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester Total hours practical is 34.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 4.36 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Knowledge 1. LO-KC-4: Mastering theoretical concepts in the development of appropriate technology that is applicable in the community to increase agricultural production. Specific Skill 1. LO-SS-2: Capable of applying and modifying local wisdom by using the latest science and technology to be

	applied in plant cultivation practices with specific locations.
Content	1. Introduction of soil for agriculture (definition, function, etc). 2. Soil genesis: factors affecting soil formation and soil phases, 3. Soil components for agriculture. 4. Soil chemistry (soil acidity, soil alkalinity, CEC, SOM, soil liming). 5. Soil physics (soil texture, soil structure, soil pores, soil bulk density, soil specific density, soil moisture). 6. Soil biology (soil fauna and soil flora). 7. Soil development in Indonesia (Soil distribution and soil classification). 8. Examination.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Writing paper 3. Photographs collection on agricultural objects
Media employed	LCD, whiteboard, websites
Reading list	1. Buckman, H.O., N.C. Brady. 1982. Ilmu Tanah. Terjemahan Prof. Soegiman. Bhratara Karya Aksara Jakarta. 2. Huang, P.M., Li, Y. And Sumner, M.E. 2012. Handbook of Soil Sciences. Resource Management and Environmental Impacts. CRC Press. Taylor & Francis Group. New York. 3. Tan, H.T. 2011. Principles of Soil Chemistry. CRC Press. Taylor & Francis Group. 4. Research publications related to soil science.

MODULE HANDBOOK

Civic UNI 10216

Module Designation	**Civic**
Code	UNI 10216
Semester (s) in which the module is taught	1st semester/1st year
Person responsible for the module	1. Dr. LR Retno Susanti, M.Hum. 2. Civic Teaching Team
Language	Indonesian
Type of teaching	Lecture, practical, and project
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 48.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 48.00 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	2 credits (equivalent with 3.00 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-3: Capable of contributing in improving the quality of life in society, nation and state based on Pancasila. 2. LO-AV-7: Obey the law and discipline in social and state life.
Content	1. Concept, Purpose, Vision, Mission and Background importance of Civic Education. 2. National Identity. 3. National Integration. 4. The State and Constitution of Indonesia. 5. The Constitution of Indonesia as a Nation-State. 6. Rights and obligations of citizens. 7. Indonesian Democracy. 8. Law enforcement and HAM. 9. Archipelago Insights/ Geopolitics. 10. Geostrategies Indonesia/ National Resilience.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works
Media employed	LCD, whiteboard, websites
Reading list	1. Widodo, W., Anwari, B., Maryanto. 2015. Pendidikan Kewarganegaraan. Andi Offset.

	2. Wasiyem. 2021. Pendidikan Kewarganegaraan untuk Perguruan Tinggi. http://repository.uinsu.ac.id. 3. BPMKU Unila. Pendidikan Kewarganegaraan. https://bpmku.unila.ac.id.

MODULE HANDBOOK

Rural Sociology ABI 11316

Module Designation	**Rural Sociology**
Code	ABI 11316
Semester (s) in which the module is taught	2nd semester/1st year
Person responsible for the module	1. Ir. Fauzia Asyiek, M.A., Ph.D. 2. Ir. Yulian Junaidi, M.Si. 3. Dr. Riswani, S.P., M,Si. 4. Dr. Yunita, S.P., M.Si. 5. Dr. Agustina Bidarti, S.P., M.Si. 6. Henny Malini, S.P., M.Si. 7. Elly Rosana, S.P., M.Si. 8. Eka Mulayana, S.P., M.Si. 9. Indri Januarti, S.P., M.Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-5: Capable of collaborating and have social sensitivity and concern for society and the environment 2. LO-AV-7: Obey the law and discipline in social and state life Knowledge 1. LO-KC-4: Mastering theoretical concepts in the development of appropriate technology that is applicable in the community to increase agricultural production General Skill 1. LO-GS-7: Capable of responsible for the achievement of group work results, supervising and evaluating the completion of work assigned to workers under their responsibility Specific Skill

	1. LO-SS-1: Capable of applying plant cultivation in agricultural systems by utilizing biological resources creatively and innovatively.
Content	1. Understanding Rural Sociology. 2. Social Interaction. 3. Social Groups. 4. Rural Social Institutions. 5. Social System. 6. Social Structure. 7. Culture. 8. Social Problems. 9. Social Stratification. 10. Social Change. 11. Social Change in the Countryside. 12. Village Development. 13. Social Mobility. 14. Modernization.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Cohen, Bruce J.; Simamora, Sahat, translator (Bina Aksara, 1983) Sociology an Introduction, Publisher Rineka Cipta 2. Rahardjo.1999. Introduction to Rural Sociology and Agriculture. Yogyakarta: Gajah Mada University Press 3. Soerjono Soekanto, 1985, Sociology of an Introduction, Jakarta: Rajawali Press 4. Soekanto, Soejono. 2010. Sociology an Introduction. Jakarta: Raja Grafindo Persada 5. Sugihen. 1996. Rural Sociology An Introduction. Jakarta: PT Raja Grfindo Persada.

MODULE HANDBOOK

Plant Growth Regulator* PAG 113116

Module Designation	**Plant Growth Regulator***
Code	PAG 113116
Semester (s) in which the module is taught	2nd semester/1st year
Person responsible for the module	1. Dr. Ir. M. Umar Harun, M.S. 2. Dr. Irmawati, S.P., M.Si, M.Sc. 3. Dr. Ir. Lidwina Niniek S., M.Si.
Language	Indonesian
Relation to curriculum	Elective Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	4. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 5. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 6. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-4: Mastering theoretical concepts in the development of appropriate technology that is applicable in the community to increase agricultural production. General Skill 1. LO-GS-1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise. Specific Skill 1. LO-SS-8: Capable of conducting process of self-evaluation of the work group under their responsibility, and able to manage learning independently.
Content	1. Discovery of auxin, biosynthesis and metabolism, auxin transport, influence of auxin on plant development 2. Cytokinin discovery and identification, cell division and plant development, biosynthesis, metabolism and transport of cytokinin, biological role of cytokinin

	3. Discovery of gibberellins, biosynthesis and metabolism of gibberellins, influence of gibberellins on plant growth and development, physiological mechanisms of growth due to the action of gibberellins, role of gibberellins on germination 4. Discovery of Ethylene, structure and biosynthesis of ethylene, influence of ethylene on plant physiology and development 5. Identification of hormones, growth regulators, biosynthesis, metabolism and transportation of inhibitory substances, the effect of inhibitory substances on plant physiology and development.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Davies, P.R. 2007. Plant Hormones Biosynthesis, Signal Transduction, Action. Springer. 2. Lamattina, L., Polacco, J.C. 2007. Nitric Oxide in Plant Growth, Development and Stress Physiology. Springer. 3. Mengel, K., Kirby, E.A. 1982. Principles of Plant Nutrition International Potash Institute. 4. Khan, N.A. 2006. Ethylene Action in Plants. Springer. 5. Plimmer, J.R., Gammon, D., Nancy, N., Ragsdale. 2002. Encyclopedia of Agrochemicals. Wiley Online Library. 6. Research publications related to plant growth regulator.

MODULE HANDBOOK

Semester 3

Statistics PER 21116

Module Designation	**Statistics**
Code	PER 21116
Semester (s) in which the module is taught	3rd semester/2st year
Person responsible for the module	1. Prof. Dr. Ir. Siti Herlinda, M.Si. 2. Prof. Ir. Suwandi, M.Agr., Ph.D. 3. Dr. Rahmat Pratama, S.Si. 4. Arsi, S.P., M.Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	Passed PER 21116
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-1: Mastering the theoretical concepts and being able to develop science and technology for the cultivation of food crops, plantations and horticulture based on local wisdom and resources. General Skill 1. LO-GS-1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise.
Content	1. General understanding of statistics; illustration and examples to use statistics in agriculture research. 2. Understanding and relationship between population and sample; illustration dan examples to use in agriculture research.

	3. Understanding several variables (quantitative-qualitative; discreet-continue; score; nominal, ordinal, categorical, rational) illustration and examples in agriculture. 4. Understanding, illustration, calculation and application of several measurement of central tendency of agricultural data (arithmetic -harmonic-geometric mean; median, and modus). 5. Understanding, illustration, calculation and application examples on agricultural data, (minimum-maximum, rank, variance, standard deviation). 6. Understanding, illustration, calculation, and application examples of measurement of data position (percentile, quartile, etc.). 7. Explanation and examples of several techniques and methods in data presentation in form of tables, graphics, and histogram. 8. Understanding, illustration, relation, and calculation of probability and binomial distribution. 9. Understanding, illustration, relation, and calculation probability and normal distribution and Z-table. 10. Understanding, illustration, relation, and calculation probability and T-Student distribution and T-table. 11. Explanation and calculation of one sample T-test using Z-test and T-test. 12. Explanation and calculation of two sample. Comparison-wise test in equal variance by using F-max ratio dan T-test. 13. Explanation and calculation of two sample comparison-wise test in un-equal variance by using F-max ratio dan T-test. 14. Explanation, and introduction toward understanding of analysis variance (ANOVA) concept. 15. Simple explanation toward understanding and application several other methods in statistical analysis (regression, correlation, covariance, and non-parametric method).
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Gomez, K.A. and A.A. Gomez. 1984. Statistical Procedures for Agricultural Research. A Wiley Interscience Publication, John Wley and Sons. New York. 680 p.

	2. Samuels, M.L. and J.A. Witmer. 2003. Statistics for The Life sciences. Third Edition. Prentice Hall. New Jersey. 623 p. 3. Bender, F.E., L.W. Douglass, and A. Kramer. 1989. Statistical Methods for Food and Agriculture. FPP Press, London, UK. 4. Saefuddin, A., K.A. Notodipuro, A. Alamudi, dan K. Sadik. 2009. Statistika Dasar. PT. Grasindo, Jakarta. 5. Sanders, D.H. 1990. Statistics. McGraw-Hill, New York USA. 6. Supardi, U.S. 2011. Aplikasi Statistika dalam Penelitian. PT. Prima Ufuk Semesta, Jakarta. 7. SAS Institute. 1983. SAS Program and User's Guide. SAS Institute, NC, USA. 8. McDonald, J.H. 2014. Handbook of Biological Statistics (3rd ed.). Sparky House Publishing, Baltimore, Maryland. 9. Suwandi, S; Herlinda, S. Pratama, R, Arsi, A. 2022. R-code for statistical analysis of researches in plant protection. 10. Research publications related to statistics.

MODULE HANDBOOK

Plant Ecology PAG 304216

Module Designation	**Plant Ecology**
Code	PAG 304216
Semester (s) in which the module is taught	3rd semester/2st year
Person responsible for the module	1. Dr. Ir. Yakup, M.S. 2. Dr. Ir. Erizal Sodikin 3. Dr. Ir. Muhammad Ammar, M.P. 4. Dr. Ir. Maria Fitriana, M.Sc.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 34.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 4.36 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-2: Mastering the theoretical concepts of plant cultivation problems and being able to manage and solve problems in the field. General Skill 1. LO-GS-8: Capable of conducting process of self-evaluation of the work group under their responsibility, and able to manage learning independently. Specific Skill 1. LO-SS-4: Capable of identifying problems, providing alternative solutions, and making decisions in the cultivation of crops in the agricultural and plantation industrial systems.
Content	1. Definition, development, and plant ecological uses. 2. Vegetation communities, life forms, and ecotones. 3. Description and vegetation analysis of floristic and non-floristic. 4. Vegetation succession, concept and theory of climax.

MODULE HANDBOOK

	5. Plant adaptation and plant adaptation test. 6. Distribution of vegetation and plant ecotype. 7. Definition and classification of plants, as well as plant introductions. 8. Plant indicators and types of plant indicators. 9. Preservation of plant germplasm. 10. Management of plant germplasm. 11. Natural environment and natural environmental principles. 12. Environmental components (soil and water). 13. Environmental components (temperature and light). 14. The impact of the greenhouse effect on plant growth and production. 15. Agricultural perspective in controlled environment.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Aiken, C. 2018. Crop Ecology: Productivity and Management in Agricultural Systems. Calista Reference. 220 p. 2. Bohlen, P. J. and G. House. 2009. Sustainable Agroecosystem Management: Integrating Ecology, Economics and Society. CRC Press. 322 p. 3. Dris, R., I. A. Khan and R. Niskanen. 2002. Environment and Crop Production. CRC Press. 360 p. 4. Hamilton, S. K., J. E. Doll and G.P. Robertson. 2015. The Ecology of Agricultural Landscapes. Oxford University Press. 448 p. 5. Keddy, P.A. 2017. Plant Ecology: Origins, Processes, Consequences. 2nd Edition. Cambridge University Press. 624 p. 6. Kumar, U. 2018. Ecology and Plant Geography. Amiga Press, Inc. India. 224 p. 7. Larcher, W. 2003. Physiological Plant Ecology: Ecophysiology and Stress Physiology of Functional Groups. Springer. 514 p. 8. Nurman, N.J.T., C.J. Pearson and P.G. Searle. 1995. The Ecology of Tropical Food Crops. 444 p. 9. Pugnaire, F. and F. Valladares. 2007. Functional Plant Ecology. CRC Press. 746 p.

	10. Shuka, R.S. and P. Chandel. 2005. Text Book of Plant Ecology, Ethnobotany and Soil Science. Schand and Co Ltd. 512 p. 11. Yadav, S. 2021. Ecology and Phytogeography with Practical. Mahaveer Publications. 224 p 12. Vandermeer, J.H. 2010. The Ecology of Agroecosystems. Illustrated Edition. Jones and Bartlist Learning. 392 p. 13. Schulze, E-D., Beck, E., Muller-Hohenstein, K. 2002. Plant Ecology. Springer. 14. Johnson, E.A., Miyanishi, K. 2007. Plant Disturbance Ecology the Process and the Response. Academic Press. 15. Lambers, H., Chapin III, F.S., Pons, T.L. 2008. Plant Physiological Ecology. Springer. 16. Myers, J.H., Bazely, D.R. 2005. Ecology and Control of Introduced Plants. Cambridge University. 17. Gurevitch, J., Scheiner, S.M., Fox, G.A. 2006. The Ecology of Plants. Sinauer Associates. 18. Research publications related to plant ecology.

MODULE HANDBOOK

Plant Physiology PAG 114216

Module Designation	**Plant Physiology**
Code	PAG 114216
Semester (s) in which the module is taught	3rd semester/2st year
Person responsible for the module	1. Prof. Dr. Ir. Rujito Agus Suwignyo, M.Agr. 2. Dr. Ir. Munandar, M.Agr. 3. Dr. Irmawati, S.P., M. Si., M.Sc. 4. Dr. Ir. Mery Hasmeda, M.Sc. 5. Dr. Ir. Susilawai, M. Si. 6. Dr. Ir. M. Umar Harun, M.S.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	Passed PAG 109116
Module objectives/intended learning outcomes	Knowledge 1. LO-KC-3: Mastering the theoretical concepts of sustainable and environmentally friendly plant cultivation management. General Skill 1. LO-GS-1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise. Specific Skill 1. LO-SS-1: Capable of applying plant cultivation in agricultural systems by utilizing biological resources creatively and innovatively.
Content	1. Introduction, basic concept, and scope of crop Physiology. 2. Anatomy, cell structure and plant tissue. 3. Plant and water relationship. 4. Physiological function of water.

MODULE HANDBOOK

	5. Plant growth regulator. 6. Photosynthesis. 7. Photosynthesis and plant growth. 8. Plant respiration. 9. Factors affected respiration and photorespiration. 10. Enzyme 1. 11. Enzyme 2. 12. Plant growth and development. 13. Plant growth analysis. 14. Biomass, yield and yield components, harvest index.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Angus, S.M., E. Zeiger., and I.M. Meller (eds.). 2018. Plant Physiology and development. Oxford University Press, London, UK. 2. Lakitan, B. 2018. Dasar-Dasar Fisiologi Tumbuhan. Cetakan ke 14. Rajawali Press. Jakarta. INA. 3. Jain, V.K. 2017. Fundamentals of plant physiology. Schand and Company limited. New Delhi. IND. 4. Manju, M. 2021. Plant Physiology. Horizon Books. A Division of Ignited Minds Edutech P Ltd. New Delhi, IND. 5. Pessarakli, M (Ed.). 2014. Handbook of Plant and Crop Physiology. 3rd Edition. CRC Pres. Taylor and Francis Group. New York. USA. 6. Salisbury, F.B. 1992. Plant Physiology. Thomson Press Ltd. New Delhi. IND. 7. Fitter, A.H., Hay, R.K.M. 2002. Environmental Physiology of Plants. Academic Press. 8. Luttge, U. 2008. Physiological Ecology of Topical Plants. Springer. 9. Hay, R., Porter. 2006. The Physiology of Crop Yield. Blackwell Publishing. 10. Sadras, W.O., Calderini, D.F. 2009. Crop Physiology Applications for Genetic Improvement and Agronomy. Academic Press. 11. Wilkins, M.B. 1989. Advanced Plant Physiology. Longman Scientific and Technical. 12. Pessarkli, M. 2004. Handbook of Photosynthesis Second Edition. Taylor and Francis. 13. Research publications related to plant physiology.

	14. Rao, K.V.M., Raghavendra, A.S., Reddy, K.J. 2006. Physiology and Molecular Biology of Stress Tolerance in Plants. Springer. 15. Foster, G.D., Johansen, I.E., Hong, Y., Nagy, P.D. 2008. Plant Virology Protocols from Viral Sequence to Protein Function. Humana Press. 16. Hawkesford, M.J., Barraclough. 2011. The Molecular and Physiological Basis of Nutrient Use Efficiency in Crops. 17. Khan, M.A., Weber, D.J. 2008. Ecophysiology of high Salinity Tolerant Plants. Springer. 18. VK Jain. 2017. Fundamentals of Plant Physiology. Schand. 19. Lambers, H., Chapin III, F.S. 2008. Plant Physiological Ecology. Springer. 20. Stewart, P., Globig, S. 2012. Plant Physiology. Apple Academic Press. 21. William, G.H., Norman., Honer, P.A- Introduction to Plant Physiology. 22. Nobel, P. 2009. Physicochemical and Environmental Plant Physiology. Elsevier. 23. Scott, P. 2008. Physiology and Behavior of Plants. Wiley. 24. Burg, S.P. 2004. Postharvest Physiology and Hypobaric Storage of Fresh Produce. CABI Publishing.

MODULE HANDBOOK

Plant Biochemistry PAG 112216

Module Designation	**Plant Biochemistry**
Code	PAG 112216
Semester (s) in which the module is taught	3rd semester/2st year
Person responsible for the module	1. Dr. Ir. Mery Hasmeda, M.Sc. 2. Dr. Irmawati, S.P., M. Si., M.Sc. 3. Dr. Fikri Adriansyah, S.Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	Passed PAG 10116
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. General Skill 1. LO-GS-1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise. Specific Skill 1. LO-SS-1: Capable of applying plant cultivation in agricultural systems by utilizing biological resources creatively and innovatively.
Content	1. Introduction and Scope of Plant Biochemistry. 2. Structure and Function of Cell. 3. Cell Membrane and Cellular Transport 1. 4. Cell Membrane and Cellular Transport 2. 5. Enzyme, Characteristic and Function. 6. Characteristic, Structure and Protein Function as well as Nucleic Acid and genetic Information 1. 7. Characteristic, Structure and Protein Function as well as Nucleic Acid and genetic Information 2.

	8. Characteristic, Structure and Function of Lipid 1. 9. Characteristic, Structure and Function of Lipid 2. 10. Characteristic, Structure and Function of Carbohydrate 1. 11. Characteristic, Structure and Function of Carbohydrate 2. 12. Introduction of Secondary metabolites. 13. Secondary Metabolites and Their Functions 1. 14. Secondary Metabolites and Their Functions 2.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Heldt H.W., B. Piechulla, F. Heldt, 2004. Plant Biochemistry. Elsevier Science. 2. Bowsher, C. and A. Tobin. 2021. Plant Biochemistry. CRC Press. 3. Dashek, W.V. 2018. Methods in Plant Biochemistry and Molecular Biology. CRC Press. 4. Buchanan B.B., W. Gruissem, and R.L. Jones (eds). 2015. Biochemistry and Molecular Biology of Plants. American Society of Plant Biologists, Wiley Blackwell. 5. Lodish, H., Brek, A., Kaiser, C.A., Krieger, M., Scott, M.P., Bretscher, A., Ploegh, H., Matsudaira, P. 2007. Molecular Cell Biology. W.H Freeman and Company. 6. Buchanan, B.B., Gruissem, W., Jones, R.L. 2000. Biochemistry and Molecular Biology of Plants. Amer Society of Plant Physiologist Rock Maryland. 7. Davies, P.R. 2007. Plant Hormones Biosynthesis, Signal Transduction, Action. Springer. 8. Michael, F., Waxman. 1998. Agrochemical and Pesticide Safety Handbook. CRC Press. 9. Thillement, H., Zivy, M., Damerval, C., Mechin. 2006. Plant Proteomics Method and Protocol. Humana Press. 10. Knowles, D.A. 1998. Chemistry and Technology of Agrochemical Formulations. Springer Dordrecht. 11. Prasad, M.N.V. 2020. Agrochemicals Detection, Treatment and Remediation. Elsevier. 12. Plimmer, J.R., Gammon, D., Nancy, N., Ragsdale. 2002. Encyclopedia of Agrochemicals. Wiley Online Library. 13. Cremlyn, R.J.W. 1991. Agrochemicals: Preparation and Mode of Action. Wiley; 2nd edition.

	14. Goodwin., Mercer. 1988. Introduction to Plant Biochemistry. Pergamon Press. 15. Prasad, M.N.V., Strzalka, K. 2002. Physioloy and Biochemistry of Metal Toxicity and Tolerance in Plants. Kluwer Academic Publishers. 16. Lhninger, A.L., Khan, N.A. 2006. Ethylene Action in Plants. Springer. 17. Denniston, K.J., Topping, J.J., Caret, R.L. 2007. General Organic, and Biochemistry. Higher Education. 18. Pfannschmidt, T. 2009. Plant Signal Transduction Methods and Protocols. Humana Press. 19. Research publications related to plant biochemistry.

MODULE HANDBOOK

Weed Science PAG 402216

Module Designation	**Weed Science**
Code	PAG 402216
Semester (s) in which the module is taught	3rd semester/2st year
Person responsible for the module	1. Dr. Ir. Yakup, M.S. 2. Dr. Ir. Erizal Sodikin 3. Ir. Teguh Achadi, M.P.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-2: Mastering the theoretical concepts of plant cultivation problems and being able to manage and solve problems in the field. Specific Skill 1. LO-SS-4: Capable of identifying problems, providing alternative solutions, and making decisions in the cultivation of crops in the agricultural and plantation industrial systems.
Content	1. Definition of weeds and the history of weed science. 2. The role and economic meaning of weeds. 3. Weed classification. 4. Weed dispersal. 5. Sexual reproduction of weeds. 6. Reproduction of weeds vegetatively. 7. Weed dormancy and its role. 8. Kinds of weed dormancy. 9. Weed adaptation to environmental conditions. 10. Weed life strategy (R-Selection, and K-Selection).

	11. Definition of competition, and the elements contested in competition. 12. Factors that influence the competition between weeds and plants. 13. Critical period in weed competition. 14. Definition of allelopathy, allelopathic substances, and things related to allelopathy. 15. Definition of control, various types of control and integrated weed control.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Akobundu, I. O. 1987. Weed Science in The Tropic. A. Wiley Interscience Publication. New York. 522 p. 2. Anderson, W. P. 1996. Weed Science, Principles and Applications. West Publishing Company. Minnesota, US. 388 p. 3. Monaco T.J., S. C. Weller and Ashton FM. 2002. Weed Science, Principles and Practices. John Willey & Sons Inc. New Jersey, US. 688 p. 4. Naidu, V. S. G. R. 2012. Hand Book on Weed Identification. Directorate of Weed science Research. Jabalpur, India. 354 p. 5. Radosevich, S. R., J. S. Holt and C. Ghersa. 1997. Weed Ecology, Implications for Vegetations Management. John Wiley and Sons. New York. 589 p. 6. Rao VS. 2002. Principles of Weed Science. 2nd Edition. CRC Press. Boca Ratoon, Florida. 566 p. 7. Ross, M. A. and C. A. Lembi. 2008. Applied Weed Science Including the Ecology and Management of Invasive Plants. 3rd Edition. Pearson. 576 p. 8. Soerjani, M., A.J.G.H. Kostermans and G. Tjitrosoepomo. 1987. Weed of rice in Indonesia. Balai Pustaka. Jakarta. 716 p. 9. Veeramani, A. 2019. Textbook on Weed Science, Principles and Practices. New India Publishing Agency. New Delhi. 330 p.

	10. Zimdahl, R. L. 2018. Fundamentals of Weed Science 5th Edition. Academic Press. Cambridge, Massachusetts. 758 p. 11. Research publications related to weed science.

MODULE HANDBOOK

Fundamentals of Seed Science and Technology PAG 301216

Module Designation	**Fundamentals of Seed Science and Technology**
Code	PAG 301216
Semester (s) in which the module is taught	3rd semester/2st year
Person responsible for the module	1. Dr. Ir. Zaidan Panji Negara, M.Sc. 2. Dr. Ir. Mery Hasmeda, M.Sc. 3. Dr. Ir. Firdaus Sulaiman, M.Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 34.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 4.36 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-1: Mastering the theoretical concepts and being able to develop science and technology for the cultivation of food crops, plantations and horticulture based on local wisdom and resources. Specific Skill 1. LO-SS-1: Capable of applying plant cultivation in agricultural systems by utilizing biological resources creatively and innovatively.
Content	1. Definition and scope of seed technology. 2. Definition of seeds, and seedlings. 3. Definition of orthodox seeds and recalcitrant. 4. Biology of seeds. 5. Seed structure and function. 6. Sprout structure. 7. Seed chemistry. 8. Seed chemical reshuffle process. 9. Seed germination, physiology of germination, factors affecting germination.

	10. Seed, viability and vigor testing. 11. Dormancy, definition, causes of seed dormancy and treatment of dormancy breaking. 12. Seed storage, seed deterioration and its control.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. George, R.A.T. 2009. Vegetable Seed Production. Cobbi. 2. Basra, A.S. 2006. Seed Science and Technology. FPP. 3. Loewer, P. 2005. Seeds the Definitive Guide to Growing, History and Lore. Timber Press. 4. Research publications related to seed science technology.

MODULE HANDBOOK

Principles of Crop Protection PPT 21116

Module Designation	**Principles of Crop Protection**
Code	PPT 21116
Semester (s) in which the module is taught	3rd semester/2st year
Person responsible for the module	1. Dr. Ir. Suparman SHK 2. Prof. Dr. Ir. Siti Herlinda, M. Si. 3. Ir. Bambang Gunawan, M. Si. 4. Arsih, S.P., M. Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 34 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 4.36 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-2: Mastering the theoretical concepts of plant cultivation problems and being able to manage and solve problems in the field. Specific Skill 1. LO-SS-11: Capable of thinking analytically and synthetically regarding plant cultivation problems and be responsive to the development of related science and technology.
Content	1. Scope of crop protection; insect as crop pest and the impact of their attack to crops. 2. Mite and mice as crop pest and the impact of their attack to crops. 3. Wild pig, bird and snail as crop pest and the impact of their attack to crops. 4. Cultural and biological techniques 5. Resistant variety, physical control and mechanical control techniques.

	6. Plant quarantine and chemical control technique. 7. The use of sterile male and Integrated Pest Management. 8. Introducing plant disease: how pathogen cause disease on plants. 9. Plant disease symptoms. 10. Fungi as plant pathogen. 11. Bacteria as plant pathogen. 12. Virus and nematode as plant pathogen. 13. Exclusion, eradication, physical and cultural techniques. 14. Chemical control of plant diseases.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Chandrasekaran B, Annadurai K and Somasundaram. 2010. A Textbook of Agronomy. New Age International Publishers New Delhi. 2. Pareek A, Sopory SK, Bohnert HJ, and Govindjee. 2010. Abiotic Stress in Plants. Springer, Dordrecht, Nederland. 3. Kethan SK. 2001. Microbial Pest Control. Markel Dekker, Inc. New York. 4. Levine MJ.2007. Pesticides; A toxic time bomb in our midst. Praeger, London. 5. Agrios GN. 2005. Plant Pathology 5th Ed. Elsevier Academic Press, New York. 6. Ebbels DL. 2003. Principles of Plant Health and Quarantine. CABI Publishing, Cambridge. 7. Research publications related to crop protection.

MODULE HANDBOOK

Soil Fertility PTN 20116

Module Designation	**Soil Fertility**
Code	PTN 20116
Semester (s) in which the module is taught	3rd semester/2st year
Person responsible for the module	1. Prof. Dr. Ir. Dedik Budianta, MS. 2. Ir, Marsi, M.Sc, Ph.D. 3. Dr. Ir. A. Napoleon, M.P. 4. Dr. Ir. Agus Hermawan, M.S. 5. Prof. Dr. Ir. Nuni Gofar, M.S. 6. Dr. Ir. Madjid Rohim, M.S. 7. Ir. Sabarudin, MSc. Ph.D. 8. Ir. Siti Nurul Aidil Fitri, M.S. 9. Dr. Ir. Madjid Rohim, M.S.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 34.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 48.36 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-2: Mastering the theoretical concepts of plant cultivation problems and being able to manage and solve problems in the field. General Skill 1. LO-GS-8: Capable of conducting process of self-evaluation of the work group under their responsibility, and able to manage learning independently. Specific Skill 1. LO-SS-14: Capable of identifying problems, providing alternative solutions, and making decisions in the cultivation of crops in the agricultural and plantation industrial systems.

Content	1. Introduction of soil fertility for agriculture (definition, function, history of soil fertility). 2. Factors affecting the plant growth and its measurements. 3. Principles of soil and plant relationship for plant growth. 4. Soil nutrients for agriculture (Macro and micro elements and its role for plant growth). 5. Mechanisms nutrient uptake for plant growth. 6. Efforts to improve soil fertility (SOM and liming). 7. Soil fertility evaluation. 8. Examination.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Adams, F. 1984. Soil Acidity and Liming. Soil Sci. Soc. Am. Inc. Madison. USA. 2. Marschner, H. 1986. Mineral nutrition in Higher Plants. Academic. Press Inc. London. 674. P. 3. Mengel, K. and E.A. Kirkby. 1987. Principles of plant nutrition. International Potash Institute. Bern, Switzerland. 687 p. 4. Nyakpa, M.Y., A.M. Lubis, M.A. Pulung, A.G. Amrah, A. Munawar, N. Hakim and G.B. Hong. 1985. Kesuburan Tanah. BKS PTN. WUAE Project, Palembang. 5. Tisdale, S.L., W.L. Nelson, and J.D. Beaton. 1984. Soil Fertility and Fertilizer. Macmillan Pub. Co., New York. 6. Budianta, D and D. Ristiani. 2013. Pengelolaan Kesuburan Tanah. Unsri Press. 7. Stevenson, F.J. 1994. Humus Chemistry: Genesis, composition and reaction. 2nd edition. Wiley. 8. Research publications related to soil fertility.

MODULE HANDBOOK

Semester 4

Experimental Design PER 24116

Module Designation	**Experimental Design**
Code	PER 24116
Semester (s) in which the module is taught	4th semester/2nd year
Person responsible for the module	1. Prof. Dr. Ir. Siti Herlinda, M.Si. 2. Prof. Ir. Suwandi, M.Agr., Ph.D. 3. Dr. Rahmat Pratama, S.Si. 4. Arsi, S.P., M.Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	Passed PER 21115
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-3: Mastering the theoretical concepts of sustainable and environmentally friendly plant cultivation management. General Skill 1. LO-GS-1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise. Specific Skill 1. LO-SS-4: Capable of identifying problems, providing alternative solutions, and making decisions in the cultivation of crops in the agricultural and plantation industrial systems. 2. LO-SS-9: Capable of conducting basic research on the development and implementation of plant cultivation

MODULE HANDBOOK

	science and technology based on scientific methodologies to generate specific plant cultivation ideas or recommendations.
Content	1. Introduction: Basic principle, assumption, application, and experimental design models. 2. Single factor experimental design: Completely random design. 3. Single factor experimental design: Randomized complete 4. Mean comparison methods: LSD, HSD, Duncann, and Contrast analysis. Application and calculation example 5. Factorial design in agriculture. Application and calculation examples. 6. Factorial split plot design in agriculture. Application and calculation examples 7. Simple regression, and correlation analysis in agricultural 8. General problem, precision, accuracy, and bias in agricultural research; prevention and remediation (case study) 9. General example in calculation of ANOVA, LSD, HSD, Duncann, and contrast analysis by using computer program (Excel and SAS)
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Casler, M.D. 2014. Fundamentals of Experiment Design: Guidelines for Designing successful Experiments. Agronomy Journal 107 (2): 692 – 705. 2. Gaspersz, V. 1995. Teknik analisis dalam penelitian percobaan 2. Transito. Bandung. 718 h. 3. Gomez, K.A. and A.A. Gomez. 1984. Statistical Procedures for Agricultural Research. A Wiley Interscience Publication, John Wiley and Sons. New York. 680 p. 4. Hashmand, R. 2017. Design Experiments for Agricultural and The Natural Sciences. Chapman and Hall/CRC. New York. 456 p. 5. Petersen, R.G. 1994. Agricultural Field Experiments, Design and Analysis. CRC Press. 426 p. 6. Kwanchai A. Gomez, Arturo A. Gomez. 1984. Statistical Procedures for Agricultural Research. A Wiley-Interscience publication. 7. McDonald, J.H. 2014. Handbook of Biological Statistics (3rd ed.). Sparky House Publishing, Baltimore, Maryland.

	8. Bender, F.E., L.W. Douglass, and A. Kramer. 1989. Statistical Methods for Food and Agriculture. FPP Press, London, UK. 9. Gomez,K.A. and A.A. Gomez. 2015. Statistical Procedures for Agricultural Research. UI Press, Jakarta. 10. Milliken, G.A. and D.E. Johnson. 1992 Analysis of Messy Data. Chapman and Hall, New York, USA. 11. Saefuddin, A., K.A. Notodipuro, A. Alamudi, dan K. Sadik. 2009. Statistika Dasar. PT. Grasindo, Jakarta. 12. Supardi, U.S. 2011. Aplikasi Statistika dalam Penelitian. PT. Prima Ufuk Semesta, Jakarta. 13. SAS Institute. 1983. SAS Program and User Guides. SAS Institute, NC, USA. 14. Steel, R.G.D and J.H. Torrie. 1980. Principles and Procedures of Statistics. McGraw Hill Book Co., New York, USA. 15. Research publications related to experimental design.

MODULE HANDBOOK

Plant Breeding PAG 110216

Module Designation	**Plant Breeding**
Code	PAG 110216
Semester (s) in which the module is taught	4th semester/2nd year
Person responsible for the module	1. Dr. Ir. E. S. Halimi, M.Sc. 2. Dr. Ir. Dwi Putro Priadi, M.Sc. 3. Dr. Ir. Mery Hasmeda, M.Sc. 4. Dr. Fikri Adriansyah, S.Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	Passed PAG 108116
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-5: Mastering the theoretical concepts of the latest science and technology development in plant cultivation that can be applied to the community. General Skill 1. LO-GS-1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise. Specific Skill 1. LO-SS-1: Capable of applying plant cultivation in agricultural systems by utilizing biological resources creatively and innovatively.
Content	1. Definition and role of plant breeding in crop. production. 2. Introduction, review in modern genetic, role, general conceit in plant breeding procedures.

	3. Basic concept, understanding, dan creating variation as basic capital in plant breeding. 4. Introduction of plants and genetic diversity. 5. Principles of genetics in plant breeding. 6. Methods of plant reproduction. 7. Cumulative trait inheritance and heritability. 8. Genotype x environment interactions; Inbreeding and heterosis. 9. Parent selection. 10. Establishment of a selection population through crosses. 11. Various methods for conducting advanced selection. 12. Several methods of plant breeding to obtain varieties based on the character of the plant. 13. Capita selecta in screening methods, selection methods utilized in modern plant breeding for abiotic stress tolerance (case study). 14. Capita selecta in screening methods, selection methods utilized in modern plant breeding for biotic stress tolerance (case study). 15. Capita selecta and case study in plant breeding program for cross pollinated plants for abiotic stress tolerance (case study). 16. Capita selecta in screening methods, selection methods utilized in modern plant breeding for biotic stress tolerance (case study).
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Nduat. 1996. Physiology of Stress Tolerance in Rice. IRRI. 2. Prasad, M.N.V., Strzalka, K. 2002. Physiology and Biochemistry of Metal Toxicity and Tolerance in Plants. Kluwer Academic Publishers. 3. Morot-Gaudry, J.F., Lea, P., Briat, J-F. 2004. Functional Plant Genomics. Science Publishers. 4. Buchanan., Gruissem., Jones. 2000. Biochemistry & Molecular Biology of Plants. American Society of Plant Physiology. 5. Kang, M.S., Priyadarshan, P.M. 2007. Breeding Major Food Staples. Blackwell Publishing. 6. Acquaah, G. 2012. Principles of Plant Genetics and Breeding, 2nd Edition. Wiley-Blackwell.

	7. Janick, J. 2008. Plant Breeding Reviews. Wiley-Blackwell. 8. Bharadwaj, D.N. 2019. Advanced Molecular Plant Breeding; Meeting the Challenge of Food Security. Apple Academic Press. 9. Brown, J., Caligari, P. 2008. An Introduction to Plant Breeding 1st Edition. Wiley-Blackwell; 1st edition. 10. Allard, R.W. 1999. Principles of Plant Breeding. John Wiley & Sons. 11. Koelling, C. 2018. Principles of Plant Breeding. Syrawood Publishing House. 12. Research publications related to plant breeding.

MODULE HANDBOOK

Annual Crops Cultivation PAG 204216

Module Designation	**Annual Crops Cultivation**
Code	PAG 204216
Semester (s) in which the module is taught	4th semester/2nd year
Person responsible for the module	1. Prof. Dr. Ir. Rujito Agus Suwignyo, M.Agr. 2. Ir. Teguh Achadi, M.P. 3. Fitra Gustiar, S.P., M.Si. 4. Ir. Sri Sukarmi, M.P.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 34.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 4.36 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-11: Internalize the spirit of independence, struggle, and entrepreneurship. Knowledge 1. LO-KC-1: Mastering the theoretical concepts and being able to develop science and technology for the cultivation of food crops, plantations and horticulture based on local wisdom and resources. Specific Skill 1. LO-SS-5: Capable of planning and evaluating efficient and effective crop cultivation systems.
Content	1. Annual crops boundaries. 2. The economic value of annual crops and their functions. 3. The development of annual crops in Indonesia. 4. The classification of annual crops. 5. The growth factors and yield of annual crops. 6. Internal factors determining growth and yield of annual crops. 7. External factors determining growth and yield of annual crops. 8. Cultivation stages of annual crops.

	9. Sugarcane cultivation. 10. Tobacco cultivation. 11. Cereal crops cultivation. 12. Bean crops cultivation. 13. Tuber cultivation.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Morachan, Y.B. 1978. Crop Production and Management. Oxford &Ibh Publishing Co., 268 P. 2. Matheson, E.M., Lovet, J.V., Blair, G.Y. & R.Y. Lawn, 1975. Annual Crop Production. A Course Manual in Annual Crop Production Academy Press. Pty. Ltd. Brisbane. 139 P. 3. Kuswanto, H. 1996. Dasar-Dasar Teknologi Produksi Tanaman Pangan. Penerbit Andi. Yogyakarta. 4. Research publications related to annual crops cultivation. 5. Research publications related to annual crops cultivation.

MODULE HANDBOOK

Perennial Crops Cultivation PAG 205216

Module Designation	**Perennial Crops Cultivation**
Code	PAG 205216
Semester (s) in which the module is taught	4th semester/2nd year
Person responsible for the module	1. Dr. Ir. M. Umar Harun, M.S. 2. Dr. Ir. Erizal Sodikin 3. Dr. Ir. Yakup, M.S. 4. Dr. Ir. Marlina, M.Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 34.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 4.36 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-11: Internalize the spirit of independence, struggle, and entrepreneurship. Knowledge 1. LO-KC-1: Mastering the theoretical concepts and being able to develop science and technology for the cultivation of food crops, plantations and horticulture based on local wisdom and resources. Specific Skill 1. LO-SS-5: Capable of planning and evaluating efficient and effective crop cultivation systems.
Content	1. Introduction to perennial crops cultivation. 2. Plant breeding and superior clone of Rubber. 3. Cultivation of rubber plant. 4. Plant breeding and superior variety of oil palm. 5. Cultivation of Oil palm. 6. Plant breeding and superior clone of Coffee. 7. Cultivation of Coffee. 8. Plant breeding and superior variety of coconut. 9. Cultivation of Coconut. 10. Cultivation of Pepper.

	11. Cultivation of Cacao. 12. Cultivation of Clove. 13. Cultivation of Areca palm. 14. Cultivation of Aren.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Tyasmoro S.Y., P.N. Permanasari, dan A. Saitama. 2021. Teknologi Produksi Tanaman Perkebunan. Universitas Brawijaya Press. 168 pp. 2. Sunarko. 2014. Budidaya Kelapa Sawit di Berbagai Jenis Lahan. Agromedia. 208 pp. 3. Corley, R.H.V. and P.B.H. Tinker. 2015. The Oil Palm. Wiley Blackwell. 680 pp. 4. Research publications related to perennial crops cultivation. 5. Research publications related to perennial crops cultivation.

MODULE HANDBOOK

Horticultural Crops Cultivation PAG 206216

Module Designation	**Horticultural Crops Cultivation**
Code	PAG 206216
Semester (s) in which the module is taught	4th semester/2nd year
Person responsible for the module	1. Prof. Dr. Ir. Benyamin Lakitan, M.Sc. 2. Dr. Ir. Muhammad Ammar, M.P. 3. Dr. Ir. Susilawati, M.Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 34.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 4.36 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-11: Internalize the spirit of independence, struggle, and entrepreneurship. Knowledge 1. LO-KC-1: Mastering the theoretical concepts and being able to develop science and technology for the cultivation of food crops, plantations and horticulture based on local wisdom and resources. Specific Skill 1. LO-SS-5: Capable of planning and evaluating efficient and effective crop cultivation systems.
Content	1. Definition, development, nutritional and economic value of horticultural crops. 2. Horticultural plant classification. 3. Growth factors and development of horticultural crops: Vegetables, Fruits, Ornamental and Biopharmaceuticals.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites

Reading list	1. Badan Pusat Statistik.2012. Konsep dan Definisi Baku Statistik Pertanian 2012. Subdirektorat Pengembangan. 2. Standardisasi dan Klasifikasi Statistik Direktorat Pengembangan Metodologi Sensus dan Survei. 478 hal. ISBN: 978-979-064-592-9. 3. Lakitan, B. 1995. Hortikultura Teori, Budidaya dan Pasca Panen. PT Raja Grafindo Persada. Jakarta. 220 hal. 4. Susilawati. 2017. Mengenal Tanaman Sayuran (Prospek dan pengelompokkan). Unsri Press. Palembang. 114 hal 5. Syukur, M., S.Sujiprihati., R.Yunianti. 2012. Teknik Pemuliaan Tanaman. Penebar Swadaya. Bogor. 348 hal. 6. Adams, C., Early, M., Brook, J., Bamford, K. 2014. Principles of Horticulture: Level 2 1st Edition. Routledge. 7. Dawson, P. 2011. A Handbook for Horticultural Students. Peter Dawson. 8. Capon, B. 2010. Botany for Gardeners, 3rd Edition. Timber Press. 9. Bird, C. 2014. The Fundamentals of Horticulture: Theory and Practice 1st Edition. Cambridge university Press. 10. Pollan, M. 2001. The Botany of Desire: A Plant's-Eye View of the World. Random House Trade Paperbacks. 11. Hodge, G. 2013. Practical Botany for Gardeners: Over 3,000 Botanical Terms Explained and Explored. University of Chicago Press. 12. Poerwanto, R., Susula, A.D. 2021. Teknologi Hortikultura. PT Penerbit IPB Press. 13. Jain, S.M., Ochatt, S.J. 2010. Protocols for In Vitro Propagation of Ornamental Plants. Humana Press. 14. Research publications related to horticultural crops cultivation.

MODULE HANDBOOK

Plant Nutrition PAG 303216

Module Designation	**Plant Nutrition**
Code	PAG 303216
Semester (s) in which the module is taught	4th semester/2nd year
Person responsible for the module	1. Dr. Ir. M. Umar Harun, M.S. 2. Dr. Ir. Susilawati, M. Si. 3. Dr. Irmawati, S.P., M. Si., M.Sc.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-2: Mastering the theoretical concepts of plant cultivation problems and being able to manage and solve problems in the field. General Skill 1. LO-GS-8: Capable of conducting process of self-evaluation of the work group under their responsibility, and able to manage learning independently.
Content	1. Classification and function of plant nutrients. 2. Mechanism of nutrient transport. 3. Plant nutrients, Photosynthesis and respiration. 4. Assimilation of N and P. 5. Assimilation of S, Mg, Ca and K. 6. Micronutrient assimilation. 7. Beneficial plant nutrients. 8. Fixation of N. 9. Mycorrhizae. 10. Foliar fertilizer. 11. Sampling of plant nutrients.

	12. Fertilizer and fertilizing plants. 13. Hydroponics. 14. Fertilization recommendation.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Kiss, S., Simihaian. 2002. Improving Efficiency of Urea Fertilizers by Inhibition of Soil Urease Activity. Kluwer Academic Publishers. 2. Marschner, H. and P. Marschner. 1995. Mineral Nutrition of Higher Plants. Academic Press. 889 pp. 3. Barker, A.V. and D.J. Pilbeam. 2016. Handbook of Plant Nutrition. CRC Press. 632 pp. 4. Mengel, K., Kirkby, E.A. 1982. Principles of Plant Nutrition International Potash Institute. 5. Epstein, E., Bloom, A.J. 2005. Mineral Nutrition of Plants: Principles and Perspective, Sinauer. 6. Amanco, S., Stule, I. 2009. Nitrogen Acquisition and Assimilation in Higher Plants. Kulwer Academic Publishers. 7. Research publications related to plant nutrition.

MODULE HANDBOOK

Organic Agriculture PAG 602216

Module Designation	**Organic Agriculture**
Code	PAG 602216
Semester (s) in which the module is taught	4th semester/2nd year
Person responsible for the module	1. Dr. Ir. Muhammad Ammar, M.P. 2. Dr. Ir. Susilawati, M.Si. 3. Dr. Ir. Maria Fitriana, M.Sc.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-1: Mastering the theoretical concepts and being able to develop science and technology for the cultivation of food crops, plantations and horticulture based on local wisdom and resources. Specific Skill 1. LO-SS-1: Capable of applying plant cultivation in agricultural systems by utilizing biological resources creatively and innovatively.
Content	1. The definition of organic agriculture. 2. The history, role and development of organic agriculture. 3. Sustainable agriculture system. 4. Differences of organic and inorganic products. 5. Integrated agriculture system. 6. SRI rice cultivation system. 7. The usage of agricultural waste, livestock, and garbage as the source of organic fertilizer. 8. Compost and composting.

	9. The role of compost in improving the quality and nutrient of organic fertilizer. 10. Various types of compost. 11. Fertilization in organic agriculture. 12. The various types of organic fertilizer. 13. Nutrient management in organic agriculture and the role of organic matter in providing nutrients. 14. The benefits of green manure on soil fertility. 15. Various types of cropping patterns in organic agriculture system. 16. Product certification in organic agriculture system
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Solomons, T.W.G., Fryhle, C.B. 2011. Organic Farming. John Wiley & Sons Inc. 2. Newton, J. 2004. Profitable Organic Farming Second Edition. Blackwell Publishing. 3. Mengel, K., Kirkby, E.A. 2001. Principles of Plant Nutrition. Kluwer Academic Publishers. 4. Altieri, M. A. 1996. Agroecology: The science of Sustainability Agriculture, West View Press. Colorado. 5. Francis, C.H. 2009. Organic Farming; the Ecological System. Agronomy Monograph 54. Amsoc Agron Inc. 6. Reijntjes, C., Bertus Havenkort dan Waters Bayer. 2003. Pertanian Masa Depan. Pengantar untuk Pertanian Berkelanjutan dengan Input Luar Rendah. Penerbit Kanisius, Yogyakarta. 7. Sutanto Rachman, 2002. Penerapan Pertanian Organik (Pemasyarakatan dan Pengembangannya). Penerbit Kanisius. Yogyakarta. 219 pp. 8. Green manure (Pupuk hijau). http://www. lestarimandiri.org.id.pupuk-organik/pupuk-hijau/273-tanaman-pupuk-hijau.html 9. Research publications related to organic agriculture.

MODULE HANDBOOK

Farm Management* ABI 24216

Module Designation	**Farm Management***
Code	ABI 24216
Semester (s) in which the module is taught	4th semester/2nd year
Person responsible for the module	1. Dr. Yunita, S.P., M.Si 2. Henny Malini, S.P., M.Si 3. Ir. Yulius, M.M. 4. Dr. Erni Purbiyanti, S.P., M.Si
Language	Indonesian
Relation to curriculum	Elective Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-9: Capable of internalizing the spirit of independence and struggle (DIKTI). 2. LO-AV-11: Internalize the spirit of independence, struggle, and entrepreneurship. General Skill 1. LO-GS-1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise. Specific Skill 1. LO-SS-1: Capable of applying plant cultivation in agricultural systems by utilizing biological resources creatively and innovatively.
Content	1. Definition Farm Management. 2. Farming and Agribusiness. 3. Farm Classification. 4. Farming Pattern. 5. Types and Patterns of Farming.

MODULE HANDBOOK

	6. Farming Structure. 7. Farm Planning. 8. Farm Production Factors. 9. Land Management in Farming. 10. The Role of Capital in Farming. 11. The Role of Human Resources in Farming. 12. Farming Costs. 13. Farming Income. 14. Farming Research.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Writing Project Paper 3. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Tohir, A.K. 1993. A strand of Indonesian Farming Knowledge. Rineka Cipta. Jakarta. 2. Soekartawi, et al. 1990. Farming Science and Research for Small Farmer Development, UI Press. Jakarta. 3. Soekarno. 2002. Farming Analysis. University of Indonesia (UI-Press). Jakarta. 4. Mubyarto. 2000. Introduction to Agricultural Economics. LP3ES. 5. Ken Suratiyah. 2002. Agricultural Science. Penebar Swadaya. 6. Suwardie. 2008. Farm Management. Wimaya Press UPN "Veteran" Yogyakarta. 7. Kay. D. Ronald, Edwards, M. William, Duff, A., Patricia. Farm Management (Text Book). Hill Education. 8. Research publications related to farm management.

MODULE HANDBOOK

Tissue Culture* PAG 605216

Module Designation	**Tissue Culture***
Code	PAG 605216
Semester (s) in which the module is taught	4th semester/2nd year
Person responsible for the module	1. Dr. Ir. Mery Hasmeda, M.Sc. 2. Dr. Ir. Zaidan Panji Negara, M.Sc. 3. Dr. Irmawati, S.P., M.Si., M.Sc. 4. Dr. Ir. Lidwina Niniek S, M.Si.
Language	Indonesian
Relation to curriculum	Elective Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Specific Skill 1. LO-SS-8: Capable of actualizing creative and innovative ideas related to plant cultivation technology into commercial activities.
Content	1. Introduction to tissue culture. 2. Cell totipotency, proliferation, cell differentiation and dedifferentiation, growth factors that benefit tissue culture. 3. Tissue culture laboratory requirements and principle of sterilization. 4. Tissue culture media. 5. The influence of explant to the growth and development of tissue. 6. Several techniques of tissue culture. 7. Micropropagation. 8. Tissue culture for producing the plants with new traits. 9. Embryo culture. 10. Anther and pollen culture.

	11. Application of tissue culture in vitro I. 12. Application of tissue culture in vitro II. 13. Application of tissue culture in vitro III. 14. Application of tissue culture in vitro IV.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Kruse Jr., P.F. and M.K. Patterson Jr. (eds). 1973. Tissue Culture: Methods and Application. Academic Press Inc. 2. Smith, R.H. 1992. Plant Tissue Culture: Techniques and Experiments. Academic Press, Inc. 3. Razdan, M.K. 2003. Introduction to Plant Tissue Culture. Science Publishers, Inc. 4. Research publications related to plant tissue culture. 5. Ibaraki, Y., Gupta, S.D. 2006. Plant Tissue Culture Engineering. Springer. 6. Cassells, A.C., Gahan, P.B. 2006. Dictionary of Plant Tissue Culture. FPP, 7. George, E.F., Hall, M.A., Klerk, G-J.D. 2008. Plant Propagation by Tissue Culture. Springer. 8. Laimer, M., Rucker, W. 2003. Plant Tissue Culture. Springer. 9. Research publications related to tissue culture.

MODULE HANDBOOK

Hydroponics* PAG 606216

Module Designation	**Hydroponics***
Code	PAG 606216
Semester (s) in which the module is taught	4th semester/2nd year
Person responsible for the module	1. Dr. Ir. Susilawati, M.Si. 2. Dr. Ir. Muhammad Ammar, M.P. 3. Dr. Ir. Irmawati, S.P., M.Sc., M.Sc. 4. Fitra Gustiar, S.P., M.Si.
Language	Indonesian
Relation to curriculum	Elective Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Specific Skill 1. LO-SS-8: Capable of actualizing creative and innovative ideas related to plant cultivation technology into commercial activities.
Content	1. Introduction to hydroponics. 2. Hydroponics development. 3. Hydroponic systems. 4. Medium of hydroponics. 5. Production system of hydroponics. 6. Macro nutrients for hydroponics 7. Micro nutrients for hydroponics 8. Nutrients formulation in hydroponics. 9. Growth factor. 10. Hydroponics cultivation techniques. 11. Hydroponics equipment. 12. Application of hydroponics.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions

	2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Bridgewood, L. 2008. Hydroponics soilles gardening explained. The Crowood Press. 2. Resh, H.M. 2002. Hydroponic for Food Production: A definitive guidebook for the advanced home gardener and the commercial hydroponic grower. 6th Ed. CRC Press, New Jersey. 568 pp. 3. Jones Jr., J.B. 1997. Hydroponics: A Practical Guide for the Soilless Grower. CRC Press, Florida. 248 pp. 4. Peckenpaugh, D. 2004. Hydroponic Solutions: Hydroponic Growing Tips, Volume 1. New Moon Publishing, Inc. 121 pp. 5. Roberto, K. 2003. How-to Hydroponics. Futuregarden, Inc. 104 pp. 6. Research publications related to hydroponics.

MODULE HANDBOOK

Semester 5

Advanced Annual Crops Cultivation PAG 207316

Module Designation	**Advanced Annual Crops Cultivation**
Code	PAG 207316
Semester (s) in which the module is taught	5th semester/3rd year
Person responsible for the module	1. Prof. Dr. Ir. Rujito Agus Suwignyo, M.Agr. 2. Dr. Ir. Firdaus Sulaiman, M.Si 3. Dr. Ir. Munandar, M.Agr. 4. Ir. Teguh Achadi, MP 5. Fitra Gustiar, S.P., M.Si
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 34.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 4.36 ECTS)
Required and recommended prerequisite for joining the module	Passed PAG 204216
Module objectives/intended learning outcomes	Attitude 1. LO-AV-10: Demonstrate a responsible attitude towards work in their area of expertise independently. Knowledge 1. LO-KC-1: Mastering the theoretical concepts and being able to develop science and technology for the cultivation of food crops, plantations and horticulture based on local wisdom and resources. 2. LO-KC-3: Mastering the theoretical concepts of sustainable and environmentally friendly plant cultivation management. General Skill 1. LO-GS-8: Capable of conducting process of self-evaluation of the work group under their responsibility, and able to manage learning independently. Specific Skill 1. LO-SS-5: Capable of planning and evaluating efficient and effective crop cultivation systems.
Content	1. Introduction of the lecture.

	2. Environmental factors of plant growth in seasonal crop cultivation systems. 3. Morphology of rice plant. 4. Rice cultivation technology. 5. Morphology and cultivation technology of corn. 6. Group discussion 1. 7. Group discussion 2. 8. Morphology and cultivation technology of soybean. 9. Morphology and cultivation technology of cassava. 10. Surjan system of cultivation technology. 11. Wetlands cultivation technology – agrosylvofishery. 12. Crop cultivation at high land. 13. Group discussion 3. 14. Group discussion 4.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Morachan, Y.B. 1978. Crop Production and Management. Oxford &Ibh Publishing Co., 268 P. 2. Matheson, E.M., Lovet, J.V., Blair, G.Y. & R.Y. Lawn, 1975. Annual Crop Production. A Course Manual in Annual Crop Production Academy Press. Pty. Ltd. Brisbane. 139 P. 3. Kuswanto, H. 1996. Dasar-Dasar Teknologi Produksi Tanaman Pangan. Penerbit Andi. Yogyakarta. 4. Research publications related to advanced annual crops cultivation.

MODULE HANDBOOK

Advanced Perennial Crops Cultivation PAG 208316

Module Designation	**Advanced Perennial Crops Cultivation**
Code	PAG 208316
Semester (s) in which the module is taught	5th semester/3rd year
Person responsible for the module	1. Dr. Ir. M. Umar Harun, M.S. 2. Dr. Erizal Sodikin 3. Dr. Ir. Yakup, M.S. 4. Dr. Ir. Marlina, M.Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 34.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 4.36 ECTS)
Required and recommended prerequisite for joining the module	Passed PAG 205216
Module objectives/intended learning outcomes	Attitude 1. LO-AV-10: Demonstrate a responsible attitude towards work in their area of expertise independently. Knowledge 1. LO-KC-1: Mastering the theoretical concepts and being able to develop science and technology for the cultivation of food crops, plantations and horticulture based on local wisdom and resources. 2. LO-KC-3: Mastering the theoretical concepts of sustainable and environmentally friendly plant cultivation management. General Skill 1. LO-GS-8: Capable of conducting process of self-evaluation of the work group under their responsibility, and able to manage learning independently. Specific Skill 1. LO-SS-15: Capable of planning and evaluating efficient and effective crop cultivation systems.
Content	1. Introduction of lecture. 2. Optimization of oil palm plantations. 3. Oil palm plantation management.

	4. Impact of drought on oil palm. 5. Oil Palm and ISPO. 6. Good Agricultural Practice of coffee. 7. Drought and coffee flowering. 8. Leaf fall and rubber plant production. 9. Rubber tapping and stimulant. 10. Nutrient deficiency in rubber. 11. Nutrient deficiency in pepper plant. 12. Stimulants for plant seeds tea. 13. Pruning and harvesting tea plants. 14. Cocoa plant polyculture.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Basra, A.S. 2006. Seed Science and Technology. FPP. 2. Anac, D., Matin-Prevel, P. 1999. Improved Crop Quality by Nutrient Management. Kluwer Academic Publishers. 3. Dick, J.S. 2009. Rubber Technology Compounding and Testing for Performance. Hanser 4. Luttge, U. 1997. Physiological Ecology of Tropical Plants. Springer. 5. Loewer, O.J., Bridges, T.C., Bucklin, R.A. 1994. On Farm Drying and Storage Systems. American Society of Agricultural Engineers. 6. Tyasmoro S.Y., P.N. Permanasari, dan A. Saitama. 2021. Teknologi Produksi Tanaman Perkebunan. Universitas Brawijaya Press. 168 pp. 7. Sunarko. 2014. Budidaya Kelapa Sawit di Berbagai Jenis Lahan. Agromedia. 208 pp. 8. Corley, R.H.V. and P.B.H. Tinker. 2015. The Oil Palm. Wiley Blackwell. 680 pp. 9. Research publications related to advanced perennial crops cultivation.

MODULE HANDBOOK

Vegetable Crops Cultivation PAG 209316

Module Designation	**Vegetable Crops Cultivation**
Code	PAG 209316
Semester (s) in which the module is taught	5th semester/3rd year
Person responsible for the module	1. Prof. Dr. Ir. Benyamin Lakitan, M.Sc. 2. Dr. Ir. Susilawati, M.Si. 3. Dr. Ir. Muhammad Ammar, M.P.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	Passed PAG 206216
Module objectives/intended learning outcomes	Attitude 1. LO-AV-11: Internalize the spirit of independence, struggle, and entrepreneurship. Knowledge 1. LO-KC-1: Mastering the theoretical concepts and being able to develop science and technology for the cultivation of food crops, plantations and horticulture based on local wisdom and resources. Specific Skill 1. LO-SS-5: Capable of planning and evaluating efficient and effective crop cultivation systems.
Content	1. Introduction (Limitation and scope of vegetable crops) 2. Nutritional content and benefits of vegetable crops 3. Vegetable plant breeding 4. Patterns of growth and development of vegetable crops 5. Grouping of vegetable crops 6. Vegetable plant growth factors 7. Vegetable cultivation techniques in macro and micro fields 8. Chili and potato cultivation techniques 9. Cucumber and cabbage cultivation techniques.
Examination forms	Quiz, Mid-terms and Final Examination

	1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. AVRDC. 1990. Vegetable Production Training Manual. Asian Vegetable Research and Development Centre. Shanhua, Tainan. 447 p. 2. Daliway, M.S. 2017. Classification of Vegetable Crops. Punjab Agriculture University. Punjab, India. 7 p. 3. Rana, M.K. 2021. Fundamentals of Vegetable Production. New India Publishing Agency (NIPA). 300 p. 4. Shinha, N.K., Y.H. Hui and E.Q Evranuz. 2011. Handbook of Vegetables and Vegetable Processing. Blackwell Publishing Ltd. Iowa. 772 p. 5. Badan Pusat Statistik.2012. Konsep dan Definisi Baku Statistik Pertanian 2012. Subdirektorat Pengembangan. 6. Standardisasi dan Klasifikasi Statistik Direktorat Pengembangan Metodologi Sensus dan Survei. 478 hal. ISBN: 978-979-064-592-9. 7. Lakitan, B. 1995. Hortikultura Teori, Budidaya dan Pasca Panen. PT RajaGrafindo Persada. Jakarta. 220 hal. 8. Susilawati. 2017. Mengenal Tanaman Sayuran (Prospek dan pengelompokkan). Unsri Press. Palembang. 114 hal 9. Syukur, M., S.Sujiprihati., R.Yunianti. 2012. Teknik Pemuliaan Tanaman. Penebar Swadaya. Bogor. 348 hal. 10. Maynard, D.N., Hochmuth, G.J. 2007. Vegetable Growers. Wiley. 11. Adams, C., Early, M., Brook, J., Bamford, K. 2014. Principles of Horticulture: Level 2 1st Edition. Routledge. 12. Dawson, P. 2011. A Handbook for Horticultural Students. Peter Dawson. 13. Capon, B. 2010. Botany for Gardeners, 3rd Edition. Timber Press. 14. Bird, C. 2014. The Fundamentals of Horticulture: Theory and Practice 1st Edition. Cambridge university Press. 15. Pollan, M. 2001. The Botany of Desire: A Plant's-Eye View of the World. Random House Trade Paperbacks. 16. Hodge, G. 2013. Practical Botany for Gardeners: Over 3,000 Botanical Terms Explained and Explored. University of Chicago Press. 17. Poerwanto, R., Susula, A.D. 2021. Teknologi Hortikultura. PT Penerbit IPB Press. 18. Jain, S.M., Ochatt, S.J. 2010. Protocols for In Vitro Propagation of Ornamental Plants. Humana Press.

	19. Research publications related to vegetable crops cultivation.

MODULE HANDBOOK

Fruit Crops Cultivation PAG 210316

Module Designation	**Fruit Crops Cultivation**
Code	PAG 210316
Semester (s) in which the module is taught	5th semester/3rd year
Person responsible for the module	1. Dr. Ir. Zaidan Panji Negara, M.Sc. 2. Dr. Ir. Muhammad Ammar, M.P. 3. Dr. Ir. Susilawati, M.Si. 4. Ir. Sri Sukarmi, M.P.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	Passed PAG 206216
Module objectives/intended learning outcomes	Attitude 1. LO-AV-11: Internalize the spirit of independence, struggle, and entrepreneurship. Knowledge 1. LO-KC-1: Mastering the theoretical concepts and being able to develop science and technology for the cultivation of food crops, plantations and horticulture based on local wisdom and resources. Specific Skill 1. LO-SS-5: Capable of planning and evaluating efficient and effective crop cultivation systems.
Content	1. RPS explanation and contract lectures. 2. Limitations of fruit crops, economic meaning and nutritional value of fruit plants, development of fruit crops. 3. Fruit plant propagation techniques. 4. Duku cultivation and cultivation techniques. 5. Fruit plant classification. 6. Watermelon plants and cultivation techniques. 7. Citrus plants and cultivation techniques. 8. Fruit plant growth factors.

	9. Papaya plants and cultivation techniques. 10. Strawberry plants and cultivation techniques. 11. Pineapple plants and cultivation techniques.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Bal, J.S. 2007. Fruit Growing. Kalyani Publishers. Ludhiana, India. 425 p. 2. Naik, B.H. and D. Thippesh. 2014. Fundamentals of Horticulture and Production Technology of Fruit Crops. University of Agricultural and Horticultural Science. Shimago. 181 p. 3. Blancke, R. 2016. Tropical Fruits and Other Edible Plants of the World: An Illustrated Guide. https://www.pdfdrive.com/tropical-fruits-and-other-edible-plants-of-the-world-an-illustrated-guide-e183892675.html. 4. Sinha, N., Sidhu, J., Barta, J., Wu, J., Cano, M.P. 2012. Handbook of Fruits and Fruit Processing. Wiley-Blackwell. https://www.perlego.com/book/1012115/handbook-of-fruits-and-fruit-processing-pdf. 5. Crichton., Alexanter, D. 2007. Fruit in General. http://www.archive.org/details/australasianfrui00cricrich. 6. Dimitrov, S., Pieri, T.F.A. 2017. Tropical Fruits. https://www.pdfdrive.com/tropical-fruits-from-cultivation-to-consumption-and-health-benefits-fruits-from-the-amazon-e158273935.html. 7. Research publications related to fruit crops

MODULE HANDBOOK

Agricultural Machinery and Equipment PTE 33316

Module Designation	**Agricultural Machinery and Equipment**
Code	PTE 33316
Semester (s) in which the module is taught	5th semester/3rd year
Person responsible for the module	
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-1: Mastering the theoretical concepts and being able to develop science and technology for the cultivation of food crops, plantations and horticulture based on local wisdom and resources. Specific Skill 1. LO-SS-1: Capable of applying plant cultivation in agricultural systems by utilizing biological resources creatively and innovatively.
Content	1. Introduction (terminology, definition, objectives, scope area, course contract). 2. Primary tillage and Secondary tillage. 3. Mold board plow, disk plow and rotary plow. 4. Disk harrow, chisel, and spike tooth harrow. 5. Subsoiler and special tillage tools. 6. Row crop planter. 7. Transplanter. 8. Cultivating tools (traditional and modern). 9. Sprayer, knapsack sprayer, boom sprayer. Function of parts and spraying mechanism. 10. Harvesting concept.

	11. Traditional harvester. 12. Semi-mechanical harvester. 13. Combine harvester.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Persson, S. 1987. Mechanics of Cutting Plant Material. American Society of Agricultural Engineers. 2. Research publications related to agricultural machinery and equipment.

MODULE HANDBOOK

Weed Control PAG 403316

Module Designation	**Weed Control**
Code	PAG 403316
Semester (s) in which the module is taught	5th semester/3rd year
Person responsible for the module	1. Dr. Ir. Yakup, M.S. 2. Dr. Ir. Erizal Sodikin 3. Ir. Teguh Achadi, M.P. 4. Dr. Ir. Maria Fitriana, M.Sc.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	Passed PAG 114216
Module objectives/intended learning outcomes	Attitude 1. LO-AV-10: Demonstrate a responsible attitude towards work in their area of expertise independently. Knowledge 1. LO-KC-2: Mastering the theoretical concepts of plant cultivation problems and being able to manage and solve problems in the field. Specific Skill 1. LO-SS-4: Capable of identifying problems, providing alternative solutions, and making decisions in the cultivation of crops in the agricultural and plantation industrial systems.
Content	1. Introduction. 2. Preventive control. 3. Mechanical control. 4. Control in technical culture. 5. Biological control. 6. Chemical control (Role, classification and formulation of herbicides). 7. Chemical control (Selectivity, properties and effects on the environment).

MODULE HANDBOOK

	8. Chemical control (Herbicide application process). 9. Weed control in rice plants (upland and upland rancah). 10. Weed control in rice crops (paddy fields and tidal fields). 11. Weed control in secondary crops. 12. Weed control in horticultural crops. 13. Weed control in plantation crops. 14. Integrated weed control (IWM). 15. Economic threshold (ET) in weed control.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Akobundu, I. O. 1987. Weed Science in The Tropics. John Wiley and Sons. New York. 522 p. 2. Ampong-Nyarko, K. and S.K. De Datta. 1991. A Handbook for Weed Control in Rice. IRRI. Manila, Phillipines. 112 p. 3. Auld, D.A., K.M. Menz and C.A. Tisdell. 1987. Weed Control Economics. Academic Press Inc. London. 177 p. 4. Chauhan, B.S. and G. Mahajan. 2014. Recent Advances in Weed Management. Springer. 411 p. 5. Crafts, A.S. 2020. Modern Weed Control. University of California Press. California, US. 450 p. 6. Dodge AD. 2008. Herbicides and Plant Metabolism. Cambridge University Press. 277 p. 7. Radosevich, S. R., J. S. Holt and C. Ghersa. 1997. Weed Ecology, Implications for Vegetations Management. John Wiley and Sons. New York. 589 h. 8. Rao, A.N. and H. Matsumoto (Ed.). 2017. Weed Management in Rice in the Asian-Pacific Region. Asian-Pacific Weed Science Society (APWSS). 284 p. 9. Singh, C.M., N.N. Aagiras and S. Kumar. 1996. Weed Management. M.D. Publications, Ltd. 152 p. 10. Stoyanova, S. 2013. Application of The Modern Herbicides in weed Control in Sprange Rape. LAP LAMBERT Academic Publishing. 104 p. 11. Tu, M., C. Hurt and J.M. Randall. 2001. Weed Control Methods Handbook: Toos and Technique for Use in Natural Areas. The Nature Conservation, Wildland Invasive Species Team. 219 p. 12. Upadhyaya, M.K. and R.E. Blackshaw. 2007. Non-Chemical weed Management: Principles, Concepts and Technology. CABI. 239 p.

	13. Research publications related to weed control.

MODULE HANDBOOK

Plant Biotechnology PAG 306316

Module Designation	**Plant Biotechnology**
Code	PAG 306316
Semester (s) in which the module is taught	5th semester/3rd year
Person responsible for the module	1. Dr. Ir. Mery Hasmeda, M.Sc. 2. Dr. Ir. E. S. Halimi, M.Sc. 3. Dr. Fikri Adriansyah, S.Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-5: Mastering the theoretical concepts of the latest science and technology development in plant cultivation that can be applied to the community. General Skill 1. LO-GS-8: Capable of conducting process of self-evaluation of the work group under their responsibility, and able to manage learning independently. Specific Skill 1. LO-SS-2: Capable of applying and modifying local wisdom by using the latest science and technology to be applied in plant cultivation practices with specific locations. 2. LO-SS-8: Capable of actualizing creative and innovative ideas related to plant cultivation technology into commercial activities.
Content	1. Definition, scope and application of biotechnology. 2. DNA, Function, Structure and Isolation. 3. Enzymes of DNA modification.

	4. Principles of genetic engineering. 5. Cloning vector. 6. Technique of DNA Analysis. 7. Tissue culture and hybrid technique. 8. Cell and protoplasm fusion. 9. Introduction of marker method for plant breeding. 10. Introduction of marker method for plant breeding. 11. Application of biotechnology in agriculture 12. Transgenic plant for yield and quality improvement. 13. transgenic plant for technology and increase of chemical compound. 14. Consequences of using genetic engineering.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Lodish, H., Brek, A., Kaiser, C.A., Krieger, M., Scott, M.P., Bretscher, A., Ploegh, H., Matsudaira, P. 2007. Molecular Cell Biology. W.H Freeman and Company. 2. Hawkersfored, M.J., Buchner, P. 2001. Molecular Analysis of Plant Adaption to the Environment. Kluwer Academic Publishers. 3. Daniell, H., Chase, C. 2004. Molecular Biology and Biotechnology of Plant Organelles Chloroplast and Mitochondria. Springer. 4. Kang, M.S., Priyadarshan, P.M. 2007. Breeding Major Food Staples. Blackwell Publishing. 5. Acquaah, G. 2012. Principles of Plant Genetics and Breeding, 2nd Edition. Wiley-Blackwell. 6. Xu, Y. 2010. Molecular Plant Breeding. International Maize and Wheat Improvement Centre (CIMMYT), China. 7. Kang, M.S. 2002. Quantitative Genetics, Genomics and Plant Breeding. CABI; 2nd edition. 8. Bharadwaj, D.N. 2019. Advanced Molecular Plant Breeding; Meeting the Challenge of Food Security. Apple Academic Press. 9. Prasad, M.N.V., Strzalka, K. 2002. Physiology and Biochemistry of Metal Toxicity and Tolerance in Plants. Kluwer Academic Publishers. 10. Kole, C. 2007. Genome Mapping and Molecular Breeding in Plants. Technical Crops. Spinger. 11. Kahl, G., Meksem, K. 2004. The Handbook of Plant Functional Genomics. Willey-Blackwell.

	12. Research publications related to plant biotechnology.

MODULE HANDBOOK

Spice, Medicinal and Industrial Crops Cultivation* PAG 211316

Module Designation	**Spice, Medicinal and Industrial Crops Cultivation***
Code	PAG 211316
Semester (s) in which the module is taught	5th semester/3rd year
Person responsible for the module	1. Dr. Ir. Muhammad Ammar, M.P. 2. Ir. Sri Sukarmi, M.P. 3. Ir. Teguh Achadi, M.P. 4. Dr. Ir. Susilawati, M.Si. 5. Dr. Ir. Mery Hasmeda, M.Sc. 6. Dr. Ir. Lidwina Niniek S, M.Si.
Language	Indonesian
Relation to curriculum	Elective Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-11: Internalize the spirit of independence, struggle, and entrepreneurship. Knowledge 1. LO-KC-1: Mastering the theoretical concepts and being able to develop science and technology for the cultivation of food crops, plantations and horticulture based on local wisdom and resources. Specific Skill 1. LO-SS-5: Capable of planning and evaluating efficient and effective crop cultivation systems.
Content	1. Introduction. 2. Definition and Benefits of herbs and drugs. 3. Grouping and Benefits of Spice, Medicinal and Industrial Plants. 4. History, systematics, morphology, benefits, growing conditions Aloe vera, Quinine. 5. Cultivation and post-harvest techniques and analysis of Aloe Vera farming, Quinine.

MODULE HANDBOOK

	6. History, systematics, morphology, benefits, growing conditions the crown of the god, Gambir. 7. Cultivation and post-harvest techniques and farming analysis. 8. History, systematics, morphology, benefits, conditions for growing Dlingo, Lemongrass. 9. Cultivation and post-harvest techniques and analysis of farming Dlingo, Lemongrass. 10. History, systematics, morphology, benefits, growing conditions Turmeric, Ginger. 11. Cultivation and post-harvest techniques and farming analysis Turmeric, Ginger. 12. History, systematics, morphology, benefits, conditions for growing Cloves, Temulawak. 13. Cultivation and post-harvest techniques as well as farming analysis Cloves, Temulawak.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Duke, J.A. 2015. Handbook of Medicinal Herbs. CRC Press. https://www.pdfdrive.com/handbook-of-medicinal-herbs-e6646387.html. 2. Herb & spice companion : the complete guide to over 100 herbs & spices. https://www.pdfdrive.com/herb-spice-companion-the-complete-guide-to-over-100-herbs-spices-e158313947.html. 3. Simone, M. 2012. The Herb Handbook: A Practical Guide To Using And Growing Herbs. https://www.pdfdrive.com/the-herb-handbook-a-practical-guide-to-using-and-growing-herbs-e156645056.html. 4. Rosemary, G. 2016. Rosemary Gladstar's Medicinal Herbs: A Beginner's Guide: 33 Healing Herbs to Know, Grow, and Use. https://www.pdfdrive.com/rosemary-gladstars-medicinal-herbs-a-beginners-guide-33-healing-herbs-to-know-grow-and-use-e175318578.html. 5. Research publications related to spice, medicinal and industrial crops cultivation.

MODULE HANDBOOK

Ornamental Plants Cultivation* PAG 212316

Module Designation	**Ornamental Plants Cultivation***
Code	PAG 212316
Semester (s) in which the module is taught	5th semester/3rd year
Person responsible for the module	1. Dr. Ir. Zaidan Panji Negara, M.Sc. 2. Dr. Ir. Muhammad Ammar, M.P. 3. Dr. Susilawati, S.P., M.Si. 4. Ir. Sri Sukarmi, M.P.
Language	Indonesian
Relation to curriculum	Elective Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	Passed PAG 206216
Module objectives/intended learning outcomes	Attitude 1. LO-AV-11: Internalize the spirit of independence, struggle, and entrepreneurship. Knowledge 1. LO-KC-1: Mastering the theoretical concepts and being able to develop science and technology for the cultivation of food crops, plantations and horticulture based on local wisdom and resources. Specific Skill 1. LO-SS-5: Capable of planning and evaluating efficient and effective crop cultivation systems.
Content	1. Course introduction and various types of ornamental plants. 2. Agribusiness of ornamental plants; Highly demanded plants national and world-wide. 3. Infrastructures and facilities required to support the ornamental plant business. 4. Problems and basic culture of ornamental plant – media, propagation, shading. 5. Introduction to botany and various orchids. 6. Cultivation and maintenance of orchids.

	7. Theory and different types of Bonsai. 8. Starting a bonsai tree. 9. Cutted plants and cultivation. 10. Cutted plants post harvest, transport and handling. 11. Various types of potted plants and cultivation. 12. Maintenance of potted plants. 13. Different types of bedding plants, Bedding preparation. 14. Cultivation and maintenace of bedding plants. 15. Hanging plants – various types and cultivation. 16. Botany and cultivation of chrysanthemum.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Jain, S.M., Ochatt, S.J. 2010. Protocols for In Vitro Propagation of Ornamental Plants. Humana Press. 2. Kalauni, K., Joshi, A. 2018. A Textbook of Ornamental Horticulture October 2018 Publisher: Heritage Publishers and Distributors Pvt. Ltd.: 3. Wait, D.D. Ornamental Plants: Their Care, Use, Propagation, and Identification - E.H.C; Revised edition. 4. Brickell, C. 1997. The American Horticultural Society A-Z Encyclopedia of Garden Plants Hardcover; DK ADULT 5. Handreck, K., Black, N. 2010. Growing Media for Ornamental Plants and Turf Paperback – University of New South Wales Press; Fourth Edition, Fourth edition. 6. Comber, J.B. 1990. Orchids of Java Published December 1st 1990 by American Orchid Society. 7. Research publications related to ornamental plants cultivation.

MODULE HANDBOOK

Irrigation and Drainage* PTN 36516

Module Designation	**Irrigation and Drainage***
Code	PTN 36516
Semester (s) in which the module is taught	5th semester/3rd year
Person responsible for the module	1. Dr. Ir. Bakri, M.P. 2. Dr. Momon Sodik Imanudin, S.P., M.Sc, 3. Dr. Ir, Satria Jaya Priatna, M.S.
Language	Indonesian
Relation to curriculum	Elective Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-5: Capable of appropriating decisions in the context of solving problems in their area of expertise, based on the results of analysis of information and data. Knowledge 1. LO-KC-2: Mastering the theoretical concepts of plant cultivation problems and being able to manage and solve problems in the field. Specific Skill 1. LO-SS-13: Capable of analyzing and evaluating potential barriers to plant cultivation on the sustainability of national biological resources.
Content	1. Introduction 2. Statistics / Groundwater Dynamics 3. Irrigation Water Source / Storage 4. Irrigation Water Quality 5. Plant Water Needs 6. Irrigation Water Delivery Method 7. Planting and Irrigation Scheduling 8. Preparation of Irrigated Land

MODULE HANDBOOK

	9. Operation & Maintenance of Irrigation Network Reclamation / Drainage Project Planning Phase Identitification & Feasibility Study Phase 10. Drainage System Plan / Drainage Reclamation to Control Water Level 11. Soil (General System, Special System) Project Preparation, Installation and Maintenance (Final Project Preparation and Specifications, Installation, Operation and Maintenance) 12. Reclamation of Lebak Swamp and Tides in Indonesia 13. Equipment / Construction of Flowing Irrigation/Pumping Water Irrigation / Irrigation Efficiency 14. Water Resources Management / Forestry and Environment Policy
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Hansen, V. E., O. W. Israelsen, dan G.E. Stringham. 1986. Dasar-dasar dan Praktek Irigasi (terjemahan ke Bahasa Indonesia oleh E.P. Tachyan dan Soetjipto). Penerbit Air Langga. 2. Teknik Konservasi Tanah dan Air. 1997. Robiyanto H. Susanto dan Rahmad H. Purnomo (terjemahan : Soil and Water Concervation, Gleen O. Scwab dkk. 1990). 3. Ochs, W. J. dan B. G. Bishay. 1992. Drainage Guideline. World Bank Technical Paper No. 194. 4. Bardan, M. 2014. Irigasi. Graha Ilmu Yogyakarta. 5. Rosadi, R. A. B. 2015. Dasar-dasar Teknik Irigasi. Graha Ilmu Yogyakarta. 6. Sangsongko, D. 1985. Alih Bahasa. Ray. K. L. and Joseph. B. F. Teknik Sumber Daya Air. Penerbit Air Langga. 7. Mawardi, M. 2016. Irigasi Asas dan Praktek. Penerbit Bursa Ilmu.Research publications related to irrigation and drainage.

MODULE HANDBOOK

Fertilizer and Fertilization Technology* PTN 36216

Module Designation	**Fertilizer and Fertilization Technology ***
Code	PTN 36216
Semester (s) in which the module is taught	5th semester/3rd year
Person responsible for the module	1. Prof. Dr. Ir. Nuni Gofar, M.S. 2. And Teaching Team
Language	Indonesian
Relation to curriculum	Elective Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	Passed PTN 20116
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-2: Mastering the theoretical concepts of plant cultivation problems and being able to manage and solve problems in the field. General Skill 1. LO-GS-8: Capable of conducting process of self-evaluation of the work group under their responsibility, and able to manage learning independently. Specific Skill 1. LO-SS-11: Capable of thinking analytically and synthetically regarding plant cultivation problems and be responsive to the development of related science and technology.
Content	1. Nutrients, fertilizers, development history and fertilization concepts. 2. Meaning, availability of nutrients and the basic problems of fertilization, the history and concept of fertilization: 1. Definition of fertilizer, 2. types of fertilizer, 3. Why plants need to be fertilized. 3. The manufacture of N fertilizers, reactions in the soil.

	4. The manufacture, properties, reactions of P fertilizers. 5. The manufacture, properties and use of K fertilizer. 6. The importance of organic fertilizers and organic fertilizer technology: Understanding of organic and inorganic fertilizers and organic fertilizer technology. 7. Topics 1-6 Discussion. 8. The properties and reactions of fertilizers containing primary and secondary macro nutrients in the soil: Understanding of secondary macro fertilizers Ca, Mg, S. 9. The properties and reactions of micro fertilizers in the soil: 1. Understanding micro-fertilizers, 2. Fe fertilizers, 3. Mn fertilizers, 4. Zn fertilizers, 5. Cu fertilizers, 6. B and Mo fertilizers. 10. The manufacture, properties and reactions of compound fertilizers: Compound fertilizers, Types of compound fertilizers, NPK ratio/grade in compound fertilizers the role of nutrient evaluation. 11. The method of evaluating soil nutrient status. 12. The plant analysis method: 1. Soil and plant characteristics, 2. Plant tissue analysis method, 3. Plant parts analyzed, 4. Treat plant tissue to be analyzed. 13. The basics of applying fertilizer and recommendations for fertilizing/liming. 14. The basic economic considerations and the efficiency of fertilization and liming
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Gofar, N. 2015. Teknologi Pupuk dan Pemupukan di Lahan Suboptimal. Polimedia Publishing, Jakarta. 2. Havlin, J.L., Tisdale, S.L., Nelson, W.L., Beaton, J.D. 2013. Soil Fertility and Fertilizers: an introduction to nutrient management (6th Ed). Macmillan Publishing Company. New York, NY. 3. Jones, J.B. 2012. Plant Nutrition and Soil Fertility Manual. 2nd Ed. CRC Press. 4. Research publications related to fertilizer and fertilization.

MODULE HANDBOOK

Semester 6

Research Methods PER 31116

Module Designation	**Research Methods**
Code	PER 31116
Semester (s) in which the module is taught	6th semester/3rd year
Person responsible for the module	1. Prof. Dr. Ir. Rujito Agus Suwignyo, M.Agr. 2. Prof. Dr. Ir. Benyamin Lakitan, M.Sc.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	2 credits (equivalent with 3.00 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-2: Mastering the theoretical concepts of plant cultivation problems and being able to manage and solve problems in the field. General Skill 1. LO-GS-4: Capable to compiling a scientific description of the results of the studies mentioned above in the form of a Research Project or final project report, and upload it on the university's website. Specific Skill 1. LO-SS-5: Capable of planning and evaluating efficient and effective crop cultivation systems. 2. LO-SS-10: Capable of writing research results as mentioned above in the form of scientific articles and present them in scientific forums.
Content	1. Three cardinal sins in research & scientific writings. 2. Systematic steps in searching of research topics. 3. Research & publication as a continuum. 4. Publications and academic profession. 5. Discussion of student-selected issues.

Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	Research publications related to reseach methods.

MODULE HANDBOOK

Entrepreneurship PER 37116

Module Designation	**Entrepreneurship**
Code	PER 37116
Semester (s) in which the module is taught	6th semester/3rd year
Person responsible for the module	1. Dr. Ir. E. S. Halimi, M.Sc. 2. Ir. Teguh Achadi, M.P. 3. Dr. Ir. Susilawati, M.Si.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	2 credits (equivalent with 3.00 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-4: Upholding human values based on morals and ethics. General Skill 1. LO-GS-6: Capable of maintaining and developing work networks with supervisors, colleagues, colleagues both inside and outside the institution. Specific Skill 1. LO-SS-3: Capable of conducting plant cultivation practices and collaborating with teams from various scientific backgrounds. 2. LO-SS-4: Capable of identifying problems, providing alternative solutions, and making decisions in the cultivation of crops in the agricultural and plantation industrial systems. 3. LO-SS-6: Capable of recognizing and taking advantage of business opportunities in the field of agricultural cultivation. 4. LO-SS-8: Capable of actualizing creative and innovative ideas related to plant cultivation technology into commercial activities.
Content	1. Understanding entrepreneurship and techopreneurship, and their role in economic development.

	2. Best practices of several professional entrepreneurship in agriculture created and managed by young generation. 3. Understanding and definition of role and source of innovation and creativity to build and improve entrepreneurship. 4. Capita selecta in creativity and innovation developed by young generation. 5. Entrepreneurship creation, characters, steps, and challenges to develop entrepreneurship in agriculture; Pre-proposal creation: Inspiration, innovation, and creativity to initiate entrepreneurship unit in agriculture 6. Explanation and example on administration, organization, operational, and financial balance sheet in agriculture entrepreneurship. 7. Explanation and example of procedures and documents required to built agricultural entrepreneurship. 8. Explanation best practices on innovation, creativity, and its characters to develop entrepreneurship. 9. Explanation and examples of business proposal to develop agricultural entrepreneurship to get financial support from the bank. 10. Practice, discussion, and report to make business proposal; Instructional task to visit local entrepreneurship unit. 11. Group discussion on innovation and creativity to improve visited entrepreneurship unit. 12. Report and presentation on innovation and creativity to improve visited entrepreneurship unit (1). 13. Report and presentation on innovation and creativity to improve visited entrepreneurship unit (2).
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Kasali, R. 2010. Modul kewirausahaan untuk strata S1. Bank Mandiri, Jakarta. 2. Lembang, A. 2002. Who wants to be options entrepreneur, Gramedia. Jakarta. 3. Rhonda, A. 2008. Business plant in a day. Kanisius, Jakarta. 4. Suharno B. 2006. Langkah jitu memulai bisnis dari nol. Penebar Swadaya Jakarta 5. Suharyadi et al. 2007. Membangun usaha sukses sejak usia muda. Salemba EMpat, Jakarta.

MODUL E HANDBOOK

	6. Suryo,A. 2008. Tata cara mengurus Ijin Usaha. Pustaka Yustisia. Yogyakarta. 7. Sutomo, D. 2007. Menjadi Entrepreneur jempolan. Republika. Jakarta 8. Widyatmoko A. 2006. Seratus peluang usaha. Agromedia Pustaka. Tangerang 9. Research publications related to entrepreunership.

MODULE HANDBOOK

Field Study PAG 116316

Module Designation	**Field Study**
Code	PAG 116316
Semester (s) in which the module is taught	6th semester/3rd year
Person responsible for the module	1. Dr. Ir. Firdaus Sulaiman, M.Si. 2. Dr. Ir. Yakup, M.S. 3. Dr. Ir. Zaidan, M.Sc.
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Structured assignment (i.e.: article reading and review) 2. The class size 30-75 students per class 3. Contact hours for lecture are 0.00 hours per semester 4. Total hours practical is 34.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 2. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	1 credit (equivalent with 1.51 ECTS)
Required and recommended prerequisite for joining the module	Passed 75% of all courses belong to Agronomy (PAG code)
Module objectives/intended learning outcomes	Knowledge 1. LO-KC-2: Mastering the theoretical concepts of plant cultivation problems and being able to manage and solve problems in the field. General Skill 1. LO-GS-8: Capable of conducting process of self-evaluation of the work group under their responsibility, and able to manage learning independently. Specific Skill 1. LO-SS-11: Capable of thinking analytically and synthetically regarding plant cultivation problems and be responsive to the development of related science and technology.
Content	1. Introduction and explanation Office/Agency that handles the agricultural sector. 2. Introduction and explanation Research Institutes dealing with agricultural studies. 3. Introduction and explanation laboratories engaged in agriculture. 4. Introduction and explanation of land for food and horticulture cultivation. 5. Introduction and explanation of land for plantation and industrial crops. 6. Visit to agricultural land for food and horticulture crops.

	7. Visit to agricultural land for plantation and industrial cops. 8. Visit to Office/Agency that handles the agricultural sector. 9. Visit to ResearchInstitutes dealing with agricultural studies. 10. Visit to Research Institute engaged in food horticulture crops. 11. Visit to Research Institute engaged in plantation and industrial crops. 12. Visit to laboratories engaged in agriculture. 13. Preparation of reports and analysis of the results of field visits.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Brochures and document that given by researchers 2. Chandrasekaram, B., K. Annadurai and E. Somasundaran. 2010. A Textbook of Agronomy. New Age International (P) Limited, Publishers. New Delhi. 835 p. 3. Kandamby, G.W.T.C. 2018. Enhancement of Learning Through Field Study. Journal of Technology and Science Education (8) 4: 408 – 419. 4. Pattacim, L. 2008. Experiental Learning: The Field Study Trip, A Student Centred Curriculum. Journal of Learning and Teaching 11 (2): 1 – 16. 4. Pratley, J. 2003. Principles of Field Crop Production. 4th Edition. Oxford University Press. 576 p. 5. Shakil, A.F., W. Faizi and S. Hfeez. 2011. The Need and Importance of Field Trips at Higher Lebver in Karachi. International Journal of Academic Research in Business and social Sciences 2 (1): 11 – 16. 6. Sharma, R.K., A.K.Soni, R. Bhagat, N. Pandey and U.K. Pandey. 2014. Basic Agriculture for Engineers. Daya Publishing House. New Delhi. 117 p. 7. Singh, Y.K. 2006. Environmental Science. New Age International Publishers. New Delhi. 310 p. 8. Vastala, P. 2006. The Field Study as An Educational Technique in Open and Distance Learning. Turkish Online Journal of Distance Education 7 (4): 10 – 17.

	9. Vero, S. E. 2021. Fieldwork Ready, An Introductory Guide to Field Research for Agriculture, Environment, and Soil Scientists. Wiley. 272 p.

MODULE HANDBOOK

Advanced Plant Breeding* PAG 111316

Module Designation	**Advanced Plant Breeding***
Code	PAG 111316
Semester (s) in which the module is taught	6th semester/3rd year
Person responsible for the module	1. Dr. Ir. E. S. Halimi, M.Sc. 2. Dr. Ir. Dwi Putro Priadi, M.Sc. 3. Dr. Ir. Mery Hasmeda, M.Sc. 4. Dr. Fikri Adriansyah, S.Si.
Language	Indonesian
Relation to curriculum	Elective Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	Passed PAG 110216
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-5: Mastering the theoretical concepts of the latest science and technology development in plant cultivation that can be applied to the community. General Skill 1. LO-GS-1: Capable of applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise. 2. LO-GS-2: Capable of demonstrating independent, quality, and measurable performance. Specific Skill 1. LO-SS-3: Capable of conducting plant cultivation practices and collaborating with teams from various scientific backgrounds.
Content	1. Introduction, general review in theory, procedures, and field plot in plant breeding research.

	2. Definition of sub-optimal land. 3. Plant breeding for resistance to environmental stresses: submerged stress, drought stress, salinity stress, aluminum stress. 4. Release and distribution of cultivars. Controversy over germplasm patents. 5. Capita selecta: Plant breeding concept and procedures in important plant in Indonesia: Genetic sources, hybridization, screening, and selection methods in maize breeding program (case study). 6. Capita selecta: Plant breeding concept and procedures in important plant in Indonesia: Genetic sources, hybridization, screening, and selection methods in maize breeding program (case study). 7. Capita selecta: Plant breeding concept and procedures in important plant in Indonesia: Genetic sources, hybridization, screening, and selection methods in rice breeding program (case study). 8. Capita selecta: Plant breeding concept and procedures in important plant in Indonesia: Genetic sources, hybridization, screening, and selection methods in rice breeding program (case study). 9. Capita selecta: Plant breeding concept and procedures in important plant in Indonesia: Genetic sources, hybridization, screening, and selection methods in soybean breeding program (case study). 10. Capita selecta: Plant breeding concept and procedures in important plant in Indonesia: Genetic sources, hybridization, screening, and selection methods in palm oil breeding program (case study). 11. Capita selecta: Plant breeding concept and procedures in important plant in Indonesia: Genetic sources, hybridization, screening, and selection methods in palm oil breeding program (case study). 12. Capita selecta: Plant breeding concept and procedures in important plant in Indonesia: Genetic sources, hybridization, screening, and selection methods in vegetable breeding program (case study). 13. Capita selecta: Plant breeding concept and procedures in important plant in Indonesia: Genetic sources, hybridization, screening, and selection methods in vegetable breeding program (case study). 14. Capita selecta: Plant breeding concept and procedures in important plant in Indonesia: Genetic sources, hybridization, screening, and selection methods in ornamental plant breeding program (case study).

	15. Capita selecta: Plant breeding concept and procedures in important plant in Indonesia: Genetic sources, hybridization, screening, and selection methods in ornamental plant breeding program (case study). 16. Capita selecta: Plant breeding concept and procedures in important plant in Indonesia: Genetic sources, hybridization, screening, and selection methods in fruit plant breeding program (case study).
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Nduat. 1996. Physiology of Stress Tolerance in Rice. IRRI. 2. Stacey, G. 2008. Genetics and Genomics of Soybean. Springer. 3. Hallauer, A.R., Carena, M.J., Filho, J.B.M. 2010. Quantatitave Genetics in Maize Breeding. Springer. 4. Prasad, M.N.V., Strzalka, K. 2002. Physiology and Biochemistry of Metal Toxicity and Tolerance in Plants. Kluwer Academic Publishers. 5. Morot-Gaudry, J.F., Lea, P., Briat, J-F. 2004. Functional Plant Genomics. Science Publishers. 6. Buchanan., Gruissem., Jones. 2000. Biochemistry & Molecular Biology of Plants. American Society of Plant Physiology. 7. Kang, M.S., Priyadarshan, P.M. 2007. Breeding Major Food Staples. Blackwell Publishing. 8. Acquaah, G. 2012. Principles of Plant Genetics and Breeding, 2nd Edition. Wiley-Blackwell. 9. Xu, Y. 2010. Molecular Plant Breeding. International Maize and Wheat Improvement Centre (CIMMYT), China. 10. Kang, M.S. 2002. Quantitative Genetics, Genomics and Plant Breeding. CABI; 2nd edition. 11. Bharadwaj, D.N. 2019. Advanced Molecular Plant Breeding; Meeting the Challenge of Food Security. Apple Academic Press. 12. Prasad, M.N.V., Strzalka, K. 2002. Physioloy and Biochemistry of Metal Toxicity and Tolerance in Plants. Kluwer Academic Publishers. 13. Research publications related to reseach advanced plant breeding.

MODULE HANDBOOK

Seed Production Techniques* PAG 603316

Module Designation	**Seed Production Techniques***
Code	PAG 603316
Semester (s) in which the module is taught	6th semester/3rd year
Person responsible for the module	1. Dr. Ir. Zaidan Panji Negara, M.Sc. 2. Dr. Ir. Firdaus Sulaiman, M.Si. 3. Dr. Ir. Mery Hasmeda, M.Sc.
Language	Indonesian
Relation to curriculum	Elective Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	Passed PTN 20115
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Specific Skill 1. LO-SS-18: Capable of actualizing creative and innovative ideas related to plant cultivation technology into commercial activities.
Content	1. Legislation and seed production terminology. 2. Plant reproduction: types and characteristics of plants based on their mode of reproduction (cross-pollination and self-pollination). 3. Government regulations on seeds: Certified seed production requirements and processes. 4. Certified seed grade: Seed production between fields and between seasons. 5. Genetic integrity: Techniques to protect genetic purity in field seed production. 6. Purity analysis and determination of seed moisture content. 7. Land requirements and selection for seed production. 8. Rice seed production. 9. Field study to BPSB, Rambutan village.

	10. Soybean seed production. 11. Oil palm seed production. 12. Lectures on the garden field and Sampoerna Agro's seed processing unit. 13. Seed harvesting and conditioning. 14. Threshing and cleaning of seeds. 15. Seed drying and storage
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Basra, A.S. 2006. Seed Science and Technology. FPP. 2. Copeland, L.O., McDonald, M.B. 2001. Seed Science and Technology. Kluwer Academic Publishers. 3. Loewer, O.J., Bridges, T.C., Bucklin, R.A. 1994. On Farm Drying and Storage Systems. American Society of Agricultural Engineers. 4. Research publications related to seed production techniques.

MODULE HANDBOOK

Swampland Agriculture* PAG 213316

Module Designation	**Swampland Agriculture***
Code	PAG 213316
Semester (s) in which the module is taught	6th semester/3rd year
Person responsible for the module	1. Prof. Dr. Ir. Rujito Agus Suwignyo, M.Agr. 2. Dr. Ir. Firdaus Sulaiman, M.Si. 3. Dr. Ir. Irmawati, S.P., M.Si., M.Sc.
Language	Indonesian
Relation to curriculum	Elective Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-5: Capable of collaborating and have social sensitivity and concern for society and the environment. Knowledge 1. LO-KC-4: Mastering theoretical concepts in the development of appropriate technology that is applicable in the community to increase agricultural production. General Skill 1. LO-GS-3: Capable of examining the implications of the development or implementation of science and technology that pays attention to and applying humanities values according to their expertise based on scientific principles, procedures and ethics in order to produce solutions, ideas, designs or art criticisms. Specific Skill 1. LO-SS-13: Capable of analyzing and evaluating potential barriers to plant cultivation on the sustainability of national biological resources.
Content	1. Introduction of agriculture in swamplands 2. Typology of tidal swamps and its soil characteristics.

MODULE HANDBOOK

	3. Nontidal swamp land typology and its soil characteristics. 4. Pyrite pyrite formation and effects of pyrite oxidation. 5. Formation of peat soil, characteristics and damage impact. 6. Water management in tidal and nontidal swamplands. 7. Reclamation of water management network in swamplands. 8. Crop management in tidal swampland. 9. Crop management in nontidal swampland. 10. Nursery system in nontidal swampland. 11. Plant management on peat. 12. Mangrove ecosystem on the coastal area. 13. Mangrove ecosystem restoration. 14. Restoration of degraded peatland ecosystem.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Haryono. 2013. Lahan Rawa: Lumbung Pangan Masa Depan Indonesia. Badan Penelitian dan Pengembangan Pertanian Kementerian Pertanian. 2. Didi Ardi S., Undang Kurnia, Mamat H.S., Wiwik Hartatik, dan Diah Setyorini. 2006. Karakteristik Dan Pengelolaan Lahan Rawa. Balai Besar Penelitian Dan Pengembangan Sumberdaya Lahan Pertanian. Badan Penelitian dan Pengembangan Pertanian Departemen Pertanian. 3. Najiyati, S., Lili Muslihat dan I Nyoman N. Suryadiputra. 2005. Panduan pengelolaan lahan gambut untuk pertanian berkelanjutan Bogor: Wetlands International - xi + 231 hlm; ISBN: 979-97373-2-9 4. Reddy, K.R. and R.D. DeLaune. 2008. Biogeochemistry of Wetland: Science and Application. CRC Press. 806 pp. 5. Perillo, G.M.E., E. Wolanski, D.R. Cahoon, and M.M. Brinson (Eds). 2009. Coastal Wetlands: An Integrated Ecosystem Approach. Elsevier. 975 pp. 6. Richardson, J.J. and M.J. Vepraskas (Eds). 2001. Wetland Soils: Genesis, Hydrology, Landscapes and Classification. Lewis Publishers. 432 pp. 7. Corner, W.H., T.W. Doyle, K.W. Krauss (Eds). 2007. Ecology of Tidal Freshwater Forested Wetlands of the Southern United States. Springer. 508 pp

	8. Kadlec, R.H. and S.D. Wallace. 2009. Treatment Wetland. 2nd Ed. CRC Press. 1048 pp. 9. Research publications related to swampland agriculture.

MODULE HANDBOOK

Forest Crops Cultivation* PAG 214316

Module Designation	**Forest Crops Cultivation***
Code	PAG 214316
Semester (s) in which the module is taught	6th semester/3rd year
Person responsible for the module	1. Dr. Ir. Erizal Sodikin 2. Dr. Ir. M. Umar Harun, M.S. 3. Dr. Ir. Yakup, M.S.
Language	Indonesian
Relation to curriculum	Elective Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-11: Internalize the spirit of independence, struggle, and entrepreneurship. Knowledge 1. LO-KC-1: Mastering the theoretical concepts and being able to develop science and technology for the cultivation of food crops, plantations and horticulture based on local wisdom and resources. Specific Skill 1. LO-SS-5: Capable of planning and evaluating efficient and effective crop cultivation systems.
Content	1. Introduction. 2. Ecology of Acacia. 3. Cultivation of Acacia. 4. Ecology of Eucalyptus. 5. Cultivation of Eucalyptus. 6. Ecology of Teak plant. 7. Cultivation of Teak plant. 8. Cultivation of Jelutung. 9. Cultivation of Mahogani. 10. Cultivation of Bamboo. 11. Cultivation of Merbau.

	12. Cultivation of Kemenyan. 13. Cultivation of Sengon. 14. Development of silviculture in Indonesia.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Agus A.P., D. Sudrajad, Nurhasyby dan Danu. 2016. Pembibitan Tanaman hutan. Penebar swadaya. ISBN; 9789790027268 2. Ariyanto. H. 2006. Budidaya tanaman kehutanan. Citra aji parama. ISBN; 978-979-3483-77 3. Bratawinata, AA. 2018. Ekologi Hutan Hujan Tropis. Mulawarman University Press. ISBN: 978-602-6834-19-5 4. Chandra, A.S.A., S. Manusi., Heriyanto, dan C. Sibagariang. 2011. Pohon-pohon hutan alam rawa gambut merang. REED_GIZ. Palembang 5. Dirjen Bina Pembangunan kemendagri daerah. 2013. Tanaman Hutan untuk lahan kritis dan sumber daya air. Jakarta 6. Irwanto. 2007. Budidaya Tanaman Kehutanan. Yogyakarta 7. Julian,E. 2004. Plantation forestry in the tropic. Oxford university. ISBN; 0198509472 8. Mark. S.A., and M. J. Kelly. 2018. The practice of silviculture. Tenth edition. Wiley & son. NY. USA 9. Philip.W.N., 2006. Growing plantation forest. Springer-verlag. Heidelberg. E book. ISBN: 978-3-540-32479-9 10. Triyono, P., Y. Mile., E. Fauziah, dan D. Darusman. 2014. Hutan Rakyat. Kanisius. Yogyakarta 11. Research publications related to forest crops cultivation.

MODULE HANDBOOK

Landscape Architecture* PAG 603316

Module Designation	**Landscape Architecture***
Code	PAG 603316
Semester (s) in which the module is taught	6th semester/3rd year
Person responsible for the module	1. Dr. Ir. Yakup, M.S. 2. Dr. Ir. Zaidan Panji Negara, M.Sc. 3. Dr. Ir. E. S. Halimi, M.Sc. 4. Dr. Ir. Lidwina Niniek S, M.Si.
Language	Indonesian
Relation to curriculum	Elective Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-5: Mastering the theoretical concepts of the latest science and technology development in plant cultivation that can be applied to the community. General Skill 1. LO-GS-3: Capable of examining the implications of the development or implementation of science and technology that pays attention to and applying humanities values according to their expertise based on scientific principles, procedures and ethics in order to produce solutions, ideas, designs or art criticisms. Specific Skill 1. LO-SS-18: Capable of actualizing creative and innovative ideas related to plant cultivation technology into commercial activities.
Content	1. Definition and profession in the field of landscape architecture. 2. History of the development of landscape architecture.

MODULE HANDBOOK

	3. Garden classification, garden forms and styles. 4. Types of gardens based on their nature. 5. Getting to know art in landscape architecture. 6. Aspects of forming space, circulation, and visual aspects of landscape architecture. 7. Introduction to design elements and their uses. 8. Design principles, balance, rhythm, repetition and emphasis. 9. Design in landscape architecture. 10. Introduction and arrangement of various forms of open space. 11. Introduction to garden elements. 12. Ornamental plants in landscape architecture. 13. Green planning in garden design. 14. Park cost budget plan analysis. 15. Get to know various garden designs and analyze their designs.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Cantor, S. L. 2020. Professional and Practical Considerations for Landscape Design. Oxford University Press, Inc. New York, US. 512 p. 2. Chen, G. 2011. Landscape Architecture, Planting Design Illustrated. 2nd Edition. Architeg, Inc. California, US. 290 p. 3. Chisholen, L. A. 2018. History of Landscape Design in 100 Gardens. Timber Press. Portland, OR, US. 400 p. 4. Clark, E. 2011. The Art of The Islamic Garden. The Crowood Press Ltd. Ramsbury, United Kingdom. 208 p. 5. DK. 2017. Encyclopedia of Landscape Design Planning, Building, and Planting Your Perfect Outdoor Space. 392 p. 6. Ingels, J.E. 2009. Ornamental Horticulture: Science, Operations, and Management. Cengage Learning. 687 p. 7. Laurie, M. 1985. An Introduction to Landscape Architecture. 2nd edition. Pearson College Div. 926 p. 8. Oudolf, P. and H. Gerritsen. 2019. Planting The Natural Garden. Timber Press. Portland, OR, US. 300 p. 9. Ruggles, D.E. 2008. Ilamics Gardens and Landscapes. University of Pennsylvania Press. Pennsylvania, US. 296 p.

	10. Simmods, J.O. 1977. Landscape Architecture, A Manual of Site Planning and Design. McGraw-Hill Education, 3rd edition. 384 p. 11. Starke, B. and J.O. Simmonds. 2013. Landscape Architecture, A Manual of environmental Planning and design. Fifth Edition. McGraw Hill. 432 p. 12. Research publications related to landscape architecture.

MODULE HANDBOOK

Plant Propagation* PAG 307316

Module Designation	**Plant Propagation***
Code	PAG 307316
Semester (s) in which the module is taught	6th semester/3rd year
Person responsible for the module	1. Dr. Ir. Zaidan Panji Negara, M.Sc. 2. Dr. Ir. Mery Hasmeda, M.Sc. 3. Dr. Ir. Muhammad Ammar, M.P. 4. Dr. Ir. Marlina, M.Si.
Language	Indonesian
Relation to curriculum	Elective Course
Teaching methods	1. Lectures (explanation, discussion) 2. Structured assignment (i.e.: article reading and review) 3. The class size 30-75 students per class 4. Contact hours for lecture are 23.33 hours per semester 5. Total hours practical is 19.83 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 23.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with3.79 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-8: Capable of internalizing academic values, norms and ethics. Knowledge 1. LO-KC-4: Mastering theoretical concepts in the development of appropriate technology that is applicable in the community to increase agricultural production. General Skill 1. LO-GS-8: Capable of conducting process of self-evaluation of the work group under their responsibility, and able to manage learning independently. Specific Skill 1. LO-SS-11: Capable of thinking analytically and synthetically regarding plant cultivation problems and be responsive to the development of related science and technology.
Content	1. Introduction and definition. 2. Values of plant propagation and aspects of plant propagation. 3. Principles of plant propagation (generative and vegetative).

	4. Anatomy and physiology of plant propagation (by cuttings, grafting, grafting and grafting). 5. Principles of propagation by tissue culture. 6. Propagation of plants by special organs.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Jain, S.M,. Ochatt, S.J. 2010. Protocols for In Vitro Propagation of Ornamental Plants. Humana Press. 2. George, E.F., Hall, M.A., Klerk, G-J.D. 2008. Plant Propagation by Tissue Culture. Springer. 3. Research publications related to plant propagation.

MODULE HANDBOOK

Semester 7

Community Service Program UNI 40116

Module Designation	**Community Service Program**
Code	UNI 40116
Semester (s) in which the module is taught	7th semester/4th year
Person responsible for the module	Adviser Lecturers
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Structured assignment (i.e.: article reading and review) 2. The class size 30-75 students per class 3. Total hours practical is 272.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 2. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	4 credits (equivalent with 10.88 ECTS)
Required and recommended prerequisite for joining the module	-
Module objectives/intended learning outcomes	Attitude 1. LO-AV-4: Upholding human values based on morals and ethics, 2. LO-AV-5: Capable of collaborating and have social sensitivity and concern for society and the environment. Knowledge 1. LO-KC-5: Mastering the theoretical concepts of the latest science and technology development in plant cultivation that can be applied to the community. General Skill 1. LO-GS-8: Capable of conducting process of self-evaluation of the work group under their responsibility, and able to manage learning independently. 2. LO-GS-10: Capable of adapting quickly to the world of work and the environment. Specific Skill 1. LO-SS-12: Capable of applying and modifying local wisdom by using the latest science and technology to be applied in plant cultivation practices with specific locations.
Content	1. Preparation for implementation which includes site selection and registration. 2. Debriefing in the form of providing knowledge and training skills in the field of agriculture, health, education, economy an employment, rural socio-cultural, and village government.

	3. Work practices within the programmed period of time in the South Sumatera regional and/or other areas that have been determined. 4. Collection of data and documentation of work practices that have been carried out. 5. Making reports of work practices based on the data and documentation collected.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works
Media employed	LCD, whiteboard, websites
Reading list	1. Reading list Anonymous. 2007. Planning Your Community Service Project Based on A Communtity Service – Learning Model. Michigan State University. All Right Reserved. Michigan. 20 p. 2. Antonio, A.L., H.S. Astin and C. Cross. 2000. Community Service in Higher Education : A Look at The Faculty. The Review of Higher Education. 23 : 373 – 398. 3. Bonnet, J. 2008. Engaging in Community Service and Citizenship : A Comparative Study of Undergraduate Students Based Upon Community Service Participation Prior College.University of Maryland, USA. 171 p. 4. Butin, D. W. 2006. The Limits of Service – Learning in Higher Education. The Review of Higher Education 29 : 473 – 498. 5. Hermanto. 2019. ITS Community Service Program as Medium to Empower Community in Facing The Era of Revolution 4.0. IPTEK Journal Proceeding Series 6 : 78 – 83. 6. LPM Unsri. 2015. Pedoman Pelaksanaan Kuliah Kerja Nyata (KKN). Lembaga Pengabdian Kepada Masyarakat Unsri. Indralaya. 35 h. 7. Prastowo, J. dan E.A. Suyono. 2007. Buku Pedoman Kuliah Kerja Nyata Pembelajaran Pemberdayaan Masyarakat (KKN PPM) Perguruan Tinggi di Indonesia. Direktoran Penelitian dan Pengabdian Kepada Masyarakat, Ditjen Dikti, Depdiknas. Jakarta. 127 h. 8. Research publications related to community service program.

MODULE HANDBOOK

Field Practice PER 49216

Module Designation	**Field Practice**
Code	PER49216
Semester (s) in which the module is taught	7th semester/4th year
Person responsible for the module	Adviser Lecturers
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Structured assignment (i.e.: article reading and review) 2. The class size 30-75 students per class 3. Total hours practical is 204.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 2. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	3 credits (equivalent with 8.31 ECTS)
Required and recommended prerequisite for joining the module	Passed PER 31116
Module objectives/intended learning outcomes	Knowledge 1. LO-KC-2: Mastering the theoretical concepts of plant cultivation problems and being able to manage and solve problems in the field. General Skill 1. LO-GS-5: Capable of appropriating decisions in the context of solving problems in their area of expertise, based on the results of analysis of information and data. Specific Skill 1. LO-SS-3: Capable of conducting plant cultivation practices and collaborating with teams from various scientific backgrounds. 2. LO-SS-9: Capable of conducting basic research on the development and implementation of plant cultivation science and technology based on scientific methodologies to generate specific plant cultivation ideas or recommendations. 3. LO-SS-10: Capable of writing research results as mentioned above in the form of scientific articles and present them in scientific forums.
Content	1. Choose of field practice crop commodities (annual crops, or perennial crops). 2. Get the location of field practice activities (agricultural/plantation institutions, agro-industrial companies, agrochemical companies, or the location of certain plant cultivation). 3. Choose the aspects of plant cultivation that will become the topic of field practice activities.

	4. Preparation of proposals for the implementation of field practice activities. 5. Collect early data and information related to the topic of field practice activities. 6. Conducting interviews with competent respondents on the topic of field practice activities. 7. Following hands-on practice in the field regarding the topic of field practice activities. 8. Collect and analyze data and information, interview results, and documentation of field practice activities. 9. Preparation of reports on field practice activities 10. Completion of field practice activity reports.
Examination forms	Quiz, Mid-terms and Final Examination 1. Essays questions 2. Practical works 3. Writing Case Paper 4. Oral presentation
Media employed	LCD, whiteboard, websites
Reading list	1. Danelo, D. J. 2017. The Field Researcher's Handbook: A Guide to The Art and Science of Professional Fieldwork. Georgetown University Press. 144 p. 2. Dris, R., I.A. Khan and R. Niskanen. 2002. Environment and Crop Production. CRC Press. 360 p. 3. Jones, Jr., J. B. 2003. Agronomic Handbook, Management of Crops, Soils, and Their Fertility. CRC Press. 450 p. 4. Krishnaprabu, S. 2020. Agronomic Management Practices for Field Crop Production. Satish Serial Publishing House. 436 p. 5. Pratley, J. 2003. Principles of Field Crop Production. 4th Edition. Oxford University Press. 576 p. 6. Singh, S. S. and R. Singh. 2015. Principles and Practices of Agronomy. Kalyani Publishers. 348 p. 7. Rana, S. S. and S. C. Negi. 2018. Practical Guide to Farming System and Sustainable Agriculture. Department of Agronomy, College of Agriculture, CSK HPKV, Palampur, India. 82 p. 8. Vero, S. E. 2021. Fieldwork Ready, An Introductory Guide to Field Research for Agriculture, Environment, and Soil Scientists. Wiley. 272 p. 9. Research publications related to field research.

MODULE HANDBOOK

Research Project PER49316

Module Designation	**Research Project**
Code	PER49316
Semester (s) in which the module is taught	7th semester/4th year
Person responsible for the module	Adviser Lecturers
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Structured assignment (i.e.: article reading and review) 2. The class size 30-75 students per class 3. Total hours practical is 408.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 2. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	6 credits (equivalent with 16.47 ECTS)
Required and recommended prerequisite for joining the module	Passed PER 31116
Module objectives/intended learning outcomes	General Skill 1. LO-GS-4: Capable to compiling a scientific description of the results of the studies mentioned above in the form of a Research Project or final project report, and upload it on the university's website. 2. LO-GS-9: Capable of documenting, storing, securing, and recover data to ensure validity and preventing plagiarism. Specific Skill 1. LO-SS-9: Capable of conducting basic research on the development and implementation of plant cultivation science and technology based on scientific methodologies to generate specific plant cultivation ideas or recommendations. 2. LO-SS-10: Capable of writing research results as mentioned above in the form of scientific articles and present them in scientific forums.
Content	1.
Examination forms	1. Essays questions 2. Practical works
Reading list	1. Research publications related to research project.

MODULE HANDBOOK

Seminar PER 49416

Module Designation	**Seminar**
Code	PER 49416
Semester (s) in which the module is taught	7th semester/4th year
Person responsible for the module	Advisor Lecturers
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Structured assignment (i.e.: article reading and review) 2. The class size 30-75 students per class 3. Contact hours for lecture are 1.67 hours per semester 1. Total hours practical is 408.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 2. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	1 credit (equivalent with 1.03 ECTS)
Required and recommended prerequisite for joining the module	Passed PER 31116
Module objectives/intended learning outcomes	General Skill 1. LO-GS-9: Capable of documenting, storing, securing, and recover data to ensure validity and preventing plagiarism. Specific Skill 1. LO-SS-12: Capable of communicating aspects of plant cultivation in an attractive, efficient, effective and productive manner.
Content	1. Attend and participate in a number of seminars conducted by other students. 2. Reading research literature which has been done. 3. Write articles from the results of research carried out. 4. Present the articles that have been compiled. 5. Evaluate articles based on suggestions and input at the time of presentation.
Examination forms	Presentation
Reading list	1. Anonymous. 2018. Seminar Presentation, Intensive Academic Program. Higher Education Language and Presentation support (HELPS). University of Technology Sidney. NSW, Australia. 55 p 2. Bhavan, A. 2016. Guideline for Planning and Conducting Seminar. Development Circle, Directorate of Forests, Government of West Bengal. 12 p. 3. Notohadiprawiro, T. 1984. Hakekat Seminar dan Tesis dalam Kurikulum Pendidikan Tinggi Untuk Landasan Penyusunan Metode dan Teknik Pembimbingan. Makalah Kegiatan PPPT – UGM Sub-Perbaikan Metode Mengajar Th 1982/1983, 12 Mei 1984. 23 h.

	4. Russel, L. and M. Munter. 2011. Guide Presentations. Third Edition. Prentice Hall, Upper Saddle River. New Jersey, USA. 5. Somebody, M. 2020. Seminar Paper, How to Write Academic Paper. Dresden University Technology. Dresden. 28 p. 6. Tiberius, R. and I. Silver. 2001. Guidelines for Conducting Workshops and Seminars That Activity Engage Participants. University of Toronto, Canada. 40 p. 7. Yuzal, I., A. Wardhana, H. Hasan, J. Jebusua dan W. Nikson. 2011. Panduan Praktis Seminar. Raja Grafindo Persada. Jakarta. 230 h. 8. Research publications related to research project.

MODULE HANDBOOK

Semester 8

Research Project PER49316

Module Designation	**Research Project**
Code	PER49316
Semester (s) in which the module is taught	7th semester/4th year
Person responsible for the module	Adviser Lecturers
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Structured assignment (i.e.: article reading and review) 2. The class size 30-75 students per class 3. Total hours practical is 408.00 hours per semester
Workload (incl. Contact hours, self-study hours)	1. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 2. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	6 credits (equivalent with 16.47 ECTS)
Required and recommended prerequisite for joining the module	Passed PER 31116
Module objectives/intended learning outcomes	General Skill 1. LO-GS-4: Capable to compiling a scientific description of the results of the studies mentioned above in the form of a Research Project or final project report, and upload it on the university's website. 2. LO-GS-9: Capable of documenting, storing, securing, and recover data to ensure validity and preventing plagiarism. Specific Skill 1. LO-SS-9: Capable of conducting basic research on the development and implementation of plant cultivation science and technology based on scientific methodologies to generate specific plant cultivation ideas or recommendations 2. LO-SS-10: Capable of writing research results as mentioned above in the form of scientific articles and present them in scientific forums.
Content	1. Read literature to gain insight into research topic. 2. Determining the research topic to be carried out. 3. Reading literature to deepen knowledge about the topic of research to be carried out. 4. Preparation of the research plan proposals to be carried out. 5. Implementation of research plan proposal discussion. 6. Carrying out research in accordance with the proposals that have been prepared. 7. Processing and analysis of research data.

	8. Presenting research reports in the form of a skripsi and depending it in front of the examiner.
Examination forms	1. Essays questions 2. Practical works
Reading list	1. Berry, R. 2004. The Research Project, How to Write It. Routledge, Taylor and Francis Group. London and New York. 138 p. 2. Cryer, P. 2006. The Research Student's Guide to Success. Third Edition. Open University Press. Buckingham. 288 p. 3. Fatihudin, D. dan L. Holisin. 2011. Karya Ilmiah, Artikel Ilmiah, dan Hasil Penelitian – Skripsi, Tesis, dan Disertasi. UPP-STIM YKPN. Yogyakarta. 154 h. 4. Fry, H., S. Ketteridge and S. Marshall. 2009. A Handbook for Teaching and Learning in Higher Education. Third Edition. Routledge, Taylor and Francis Group. New York and London. 525 p. 5. Hashmand, R. 2017. Design Experiments for Agricultural and The Natural Sciences. Chapman and Hall/CRC. New York. 456 p. 6. Murray, N. and G. Hughes. 2008. Writing Up Your University, Assignments and Research Projects – A Practical Handbook. Open University Press. New York, USA. 252 p. 7. O'Leary, Z. 2017. The Essential Guide to Doing Your Research Project. Third Edition. Sage Publications nLtd. London. 751 p. 8. Unsri. 2020. Buku Pedoman Akademik dan Kemahasiswaan Tahun Akademik 2020/2021. Universitas Sriwijaya, Indralaya. 120 h. 9. Verschuren, P. and H. Doorewaard. 2010. Designing A Research Project. Second Edition. Eleven International Publishing. Nijmegen. 22 p. 10. Wahab, A dan L.A. Lestari. 1999. Menulis Karya Ilmiah. Airlangga. Surabaya. 113 h. 11. Research publications related to research project.

MODULE HANDBOOK

Seminar PER 49416

Module Designation	**Seminar**
Code	PER 49416
Semester (s) in which the module is taught	7th semester/4th year
Person responsible for the module	Advisor Lecturers
Language	Indonesian
Relation to curriculum	Compulsory Course
Teaching methods	1. Structured assignment (i.e.: article reading and review) 2. The class size 30-75 students per class 3. Contact hours for lecture are 1.67 hours per semester 2. Total hours practical is 408.00 hours per semester
Workload (incl. Contact hours, self-study hours)	3. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 4. Self-study: 2 x 60 minutes per week or 24 hours per semester
Credit points	1 credit (equivalent with 1.03 ECTS)
Required and recommended prerequisite for joining the module	Passed PER 31116
Module objectives/intended learning outcomes	General Skill 1. LO-GS-9: Capable of documenting, storing, securing, and recover data to ensure validity and preventing plagiarism. Specific Skill 1. LO-SS-12: Capable of communicating aspects of plant cultivation in an attractive, efficient, effective and productive manner.
Content	1. Attend and participate in a number of seminars conducted by other students. 2. Reading research literature which has been done. 3. Write articles from the results of research carried out. 4. Present the articles that have been compiled. 5. Evaluate articles based on suggestions and input at the time of presentation.
Examination forms	Presentation
Reading list	1. Anonymous. 2018. Seminar Presentation, Intensive Academic Program. Higher Education Language and Presentation support (HELPS). University of Technology Sidney. NSW, Australia. 55 p 2. Bhavan, A. 2016. Guideline for Planning and Conducting Seminar. Development Circle, Directorate of Forests, Government of West Bengal. 12 p. 3. Notohadiprawiro, T. 1984. Hakekat Seminar dan Tesis dalam Kurikulum Pendidikan Tinggi Untuk Landasan Penyusunan Metode dan Teknik Pembimbingan. Makalah Kegiatan PPPT – UGM Sub-Perbaikan Metode Mengajar Th 1982/1983, 12 Mei 1984. 23 h.

	4. Russel, L. and M. Munter. 2011. Guide Presentations. Third Edition. Prentice Hall, Upper Saddle River. New Jersey, USA. 5. Somebody, M. 2020. Seminar Paper, How to Write Academic Paper. Dresden University Technology. Dresden. 28 p. 6. Tiberius, R. and I. Silver. 2001. Guidelines for Conducting Workshops and Seminars That Activity Engage Participants. University of Toronto, Canada. 40 p. 7. Yuzal, I., A. Wardhana, H. Hasan, J. Jebusua dan W. Nikson. 2011. Panduan Praktis Seminar. Raja Grafindo Persada. Jakarta. 230 h. 8. Research publications related to research project.