

## Module Handbook of Agricultural Technology Education Programme

1	
Module designation (Code)	<b>Pancasila Education (18B01C101)</b>
Semester (s) in which the module is taught	1
Person responsible for the module	Dr. Subari Yanto, M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Students are able to explain the meaning of Pancasila</li> <li>2. Students are able to explain the basic purpose of Pancasila</li> <li>3. Students are able to explain Pancasila as the basis of the state</li> <li>4. Students are able to explain Pancasila as a way of life</li> <li>5. Students are able to explain as a source of law</li> <li>6. Students are able to explain Pancasila as the constitution '45 Students are able to explain Pancasila as a national ideology.</li> <li>7. Students are able to explain Pancasila as political ethics</li> <li>8. Students are able to explain Pancasila as a paradigm of state life</li> <li>9. Students are able to explain Pancasila democracy and actual problems</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. Understanding Pancasila</li> <li>2. Pancasila as the nation's view of life</li> <li>3. Pancasila as a national ideology</li> <li>4. Pancasila as political ethics</li> <li>5. Pancasila is the national development paradigm</li> <li>6. Pancasila as a paradigm of life in society, nation and state</li> <li>7. Pancasila democracy</li> <li>8. Philosophy of Pancasila</li> <li>9. Pancasila and the constitutional context of the Republic of Indonesia</li> <li>10. Human rights</li> <li>11. Pancasila and the issue of SARA</li> </ol>
Examination Forms	Formative test, Summative Test, Structured task and Quiz
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (15%), Quiz (20%) structured task (15%), midterm exam (25%) and final exam (25%)
Reading List	<ol style="list-style-type: none"> <li>1. Kaelan, 2010. Pancasila Education</li> <li>2. Subandi Al Marsudi, 2006. Pancasila and the 1945 Constitution in the Reform Paradigm</li> </ol>

	<ol style="list-style-type: none"><li>3. Elly, 2005. Setiadi Pancasila Education for Higher Education</li><li>4. Kaelan, 2004. Pancasila Education</li><li>5. Sunarjo Wreksosuhardjo, 2000. State Juridical Pancasila Science and Pancasila Philosophy Science</li><li>6. Sunarjo Wreksosuhardjo, 2005. State Juridical Pancasila Science and Pancasila Philosophy Science</li><li>7. Moerdiono et al, 1992. Pancasila as an ideology</li></ol>
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2	
Module designation (Code)	<b>Citizenship Education (18B01C102)</b>
Semester (s) in which the module is taught	1
Person responsible for the module	Dr. Subari Yanto, M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	Citizenship Education as a group of Institutional Courses functions as student orientation in strengthening the insight and spirit of nationalism, love for the homeland, democracy, legal awareness, respect for diversity and participation in building a nation based on Pancasila. In accordance with its function, Citizenship Education organizes national, democratic, legal, multicultural and citizenship education for students to support the realization of citizens who are aware of their rights and obligations, as well as intelligent, skilled and characterized so that they can be relied on to build the nation.
Content	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. The Purpose and Objectives of Citizenship Education</li> <li>3. Pancasila philosophy</li> <li>4. National Identity</li> <li>5. Citizens' rights and obligations</li> <li>6. State and Constitution</li> <li>7. Indonesian Democracy</li> <li>8. Human Rights (HAM) and the Rule of Law</li> <li>9. National Resilience Theory</li> <li>10. Archipelago Insight</li> <li>11. The Importance of Community Integration</li> <li>12. Indonesian Geopolitics</li> <li>13. Indonesian Geostrategy</li> </ol>
Examination Forms	Formative test, Summative Test, Structured task and Quiz
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (15%), Quiz (20%) structured task (15%), midterm exam (25%) and final exam (25%)
Reading List	<ol style="list-style-type: none"> <li>1. Arif, DB. 2012. Citizenship Education. Yogyakarta: Kaukaba</li> <li>2. Budiardjo. 1986, Basics of Political Science, Jakarta: PT. Gramedia, cet. X</li> <li>3. Cholisin.2000. Citizenship Science, Yogyakarta: FIS UNY</li> <li>4. Mohtar Mas'oed. 1999, State, Capital and Democracy, Yogyakarta: Student Library</li> <li>5. Surbakti, Ramlan. 1992, Understanding Political</li> </ol>

	<p>Science, Jakarta: PT. grammar</p> <ol style="list-style-type: none"><li>6. Samsuri, 2012. Citizenship Character Education: Criticism of National Character Development. Surakarta: Hanif Library.</li><li>7. Sunarso, et al. 2003. Citizenship Education for Students. Yogyakarta: UNY Press.</li></ol>
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3	
Module designation	<b>English Language(18B01C103)</b>
Semester (s) in which the module is taught	1
Person responsible for the module	Dr. Ir. Muhammad Wiharto, M.Si
Language	Bilingual (Indonesian and English)
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. After learning activities, students are expected to be able to:</li> <li>2. Explain Subject, verb, complement, modifier</li> <li>3. Explain Present Tense, Simple Past</li> <li>4. Explain Present Tens, Simple Present Tens, Present Progressive, Exercise</li> <li>5. Explain Past Tens, Simple Past Tense, Past Progressive, Exercise</li> <li>6. Explain Present Perfect, Present Perfect Progressive, Exercise</li> <li>7. Explain Past Perfect, Past Perfect Progressive, Exercise</li> <li>8. Explain Subject Verb Agreement, Exercise</li> <li>9. Explain Pronouns (Subject, Complete, Possesive adjective, Possesive Pronouns, Reflesive), Exercise</li> <li>10. Explain Verb as Complement (- Verbs that are always followed by infinitive, - Verbs that always by the gerund), exercise</li> <li>11. Explain Reading and exercise</li> <li>12. Explain Pronoun before the gerund or infinitive (the verb need, the verb in need of), Exercise</li> <li>13. Explain Question, exercise</li> <li>14. ExplainAfirmative Agreement, Exercise</li> <li>15. ExplainNegative Agreement, Exercise</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. Subject, verb, complement, modifier</li> <li>2. Present Tense, Simple Past</li> <li>3. Present Tens, Simple Present Tens, Present Progressive, Exercise</li> <li>4. Past Tens, Simple Past Tense, Past Progressive, Exercise</li> <li>5. Present Perfect, Present Perfect Progressive, Exercise</li> <li>6. Past Perfect, Past Perfect Progressive, Exercise</li> <li>7. Subject Verb Agreement, Exercise</li> <li>8. Pronouns (Subject, Complete, Possesive adjective, Possesive Pronouns, Reflesive), Exercise</li> <li>9. Verb as Complement (- Verbs that are always followed by infinitive, - Verbs that always by the gerund), exercise</li> <li>10. Reading and exercise</li> <li>11. Pronoun before the gerund or infinitive (the verb</li> </ol>

	<p>need, the verb in need of), Exercise</p> <p>12. Question, exercise</p> <p>13. Affirmative Agreement, Exercise</p> <p>14. Negative Agreement, Exercise</p>
Examination Forms	Formative test, Summative Test, Structured task and Exercise
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (15%), Quiz (20%) structured task (15%), midterm exam (25%) and final exam (25%)
Reading List	<ol style="list-style-type: none"> <li>1. Jhon Haycraft, 1982. <i>Getting On In English</i>. PT.Gramedia, Jakarta.</li> <li>2. Michael, AP. and Mary A., 2001. <i>Cliffs Toefl Preparation Guide</i>. International Data Group Company Worldwide, Inc. New York.</li> </ol>

4	
Module designation	<b>Philosophy(18B01C104)</b>
Semester (s) in which the module is taught	1
Person responsible for the module	1. Prof. Dr. Lahming, MS 2. Diyahwati, S.TP., M.Pd
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	After learning activities, students are expected to be able to: <ol style="list-style-type: none"> <li>1. Explain the Philosophy of Science</li> <li>2. Explain The Relationship between</li> <li>3. Explain Philosophy and Philosophy of Science</li> <li>4. Explain History of Science Development: Greek to Classics</li> <li>5. Explain History of Development of Science: Explain Middle to Contemporary</li> <li>6. Explain Basic Principles of Reasoning</li> <li>7. Explain Basic Assumptions of Science</li> <li>8. Explain Paradigm, Theory, Law and Scientific Concepts</li> <li>9. Explain Science Methodology</li> <li>10. Explain Scientific Truth</li> <li>11. Explain Scientific Ethics</li> <li>12. Explain Group Discussion (1)</li> <li>13. Explain Group Discussion (2)</li> <li>14. Explain Philosophy of Contextual Science</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. Introduction to the Philosophy of Science and Learning Contract</li> <li>2. Philosophy and Philosophy of Science</li> <li>3. History of Science Development: Greek to Classics</li> <li>4. History of Development of Science: Middle to Contemporary</li> <li>5. Basic Principles of Reasoning</li> <li>6. Logic and Scientific Language</li> <li>7. Basic Assumptions of Science</li> <li>8. Paradigm, Theory, Law and Scientific Concepts</li> <li>9. Science Methodology</li> <li>10. Scientific Truth</li> <li>11. Scientific Ethics</li> <li>12. Group Discussion (1)</li> <li>13. Explain Group Discussion (2)</li> <li>14. Philosophy of Contextual Science</li> </ol>
Examination Forms	Formative test, Summative Test, Structured task and Quiz
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is

	evaluated based on assignments (15%), Quiz (20%) structured task (15%), midterm exam (25%) and final exam (25%)
Reading List	<ol style="list-style-type: none"> <li>1. Mydahardjo, Redja dan Siti Lailan Azizah, 2012. <i>Filsafat Ilmu Pendidikan</i>. Bandung: Remaja Rosdakarya</li> <li>2. Adrian Husaini dkk, 2013. <i>Filsafat Ilmu perspektif Barat dan Islam</i>. Depok: Gema Insani</li> <li>3. Lahming, 2019. <i>Handbook: Filsafat Ilmu</i>. Makassar: Pendidikan Teknologi Pertanian</li> </ol>



5	
Module designation (Code)	<b>Introduction to Fisheries and Agricultural Technology(18B01C105)</b>
Semester (s) in which the module is taught	1
Person responsible for the module	1. Prof. Dr. H. Husain Syam, ST, IPU 2. RatnawatyFadilah, S.TP., M.Sc 3. Andi AlamsyahRivai, S.Pi., M.Si 4. Muhammad Rizal, S.TP., M.Si
Language	Indonesia
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit ponits	2
Required and recommended prerequisites for joining the module	-
Module onjectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Able to understand the condition of Indonesian agriculture and the history of agricultural technology development</li> <li>2. Able to understand the contribution of agriculture in economic development, problems, challenges, focus of development, advances in agricultural technology in the era of globalization</li> <li>3. Able to understand the scope of agricultural technology (agricultural mechanization, agricultural product technology, agricultural and fishery industry technology)</li> <li>4. Able to understand the utilization and management of natural resources for sustainable agricultural technology development</li> <li>5. Able to understand the role of agricultural technology in standardizing the quality of agricultural products</li> </ol>
Content	<p>This course discusses the history and development of agricultural technology, what is the role of agricultural technology in supporting the progress of Indonesian agriculture, the condition of Indonesian agriculture, the relationship between the physical and chemical characteristics of agricultural products and their processing aspects, the scope of agricultural technology, the management of natural resources to support technological development. sustainable agriculture, the scope of agricultural mechanization, an introduction to Indonesian fisheries and its scope and an introduction to agricultural industrial technology.</p>
Examination Forms	Essay, quiz, literature review
Study and Examination Requirements	<p>Requirements for successfully passing the module</p> <ol style="list-style-type: none"> <li>1. Minimum attendance at lectures is 80%.</li> <li>2. Final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%).</li> <li>3. Minimum final score is 61% ( "C" )</li> </ol>
Reading List	1. Mangunwijaya, D., Sailah, I. 2005. Pengantar

	Teknologi Pertanian. Penebar Swadaya. Jakarta 2. Nanda, V., and Sharma S. 2008. Processing technologies. Nipa
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6	
Module designation (Code)	<b>Engineering Maths(18B01C106)</b>
Semester (s) in which the module is taught	1
Person responsible for the module	1. Dr. Jamaluddin P, MP 2. Amirah Mustarin, S.Pi., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Able to learn and develop themselves (self-learning) various scientific theories that support the profession of entrepreneurs or workers in industry such as marketing, finance, product knowledge, business ethics, etc.</li> <li>2. Have broad insight about the opportunities of a scholar to have a career in big companies</li> <li>3. Able to follow developments in the business world based on the disciplined techniques he has learned.</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. The scope of mathematics courses</li> <li>2. Complex number</li> <li>3. Hyperbolic function</li> <li>4. Determinants</li> <li>5. Types of matrices</li> <li>6. Vector quantity</li> <li>7. Integration equation</li> <li>8. Integration approach</li> <li>9. integration</li> <li>10. Polar coordinates</li> <li>11. Integral, differential application in agriculture</li> </ol>
Examination Forms	Essay, quiz
Study and Examination Requirements	<p>Requirements for successfully passing the module</p> <ol style="list-style-type: none"> <li>1. Minimum attendance at lectures is 80%.</li> <li>2. Final score is evaluated based on assignments (10%), quizz (20%), midterm exam (30%) and final exam (40%).</li> <li>3. Minimum final score is 61% ( "C" )</li> </ol>
Reading List	<ol style="list-style-type: none"> <li>1. Erwin Sucipto. 1984. Engineering mathematics. Erlangga. Bandung.</li> <li>2. Didit Budi Nugroho. Integral Calculus and Its Applications. Graha Ilmu. First Printing. Yogyakarta 2012.</li> <li>3. K.A. Stroud., Dexter J. Booth. Engineering Mathematics Volume 1 Fifth Edition. Erlangga Publisher. Jakarta 2001.</li> <li>4. K.A. Stroud., Dexter J. Booth. Engineering Mathematics Volume 2 Fifth Edition. Erlangga Publisher. Jakarta 2001. Supporters:</li> <li>5. Edwin J Purcell, Dale Varberg, "Calculus with Analytic Geometry", Prentice Hall, New York, 1987.</li> </ol>

7	
Module designation (Code)	<b>Applied Physics(18B01C107)</b>
Semester (s) in which the module is taught	1
Person responsible for the module	1. Reski Febyanti Rauf, S.TP., M.Si 2. Nunik Lestari, S.T.P., M.Si 3. Andi Muhammad Akram Mukhlis, ST., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. The student will be able to explain the theory and understanding of applied physics.</li> <li>2. The student will be able to measure physical quantities, read and write down measurement results, use the International System (SI) unit by paying attention to important numbers, calculate measurement errors and convert basic and derivative quantities.</li> <li>3. The student will be able to understand motion, momentum, and impulses. Understand the mechanical and fluid properties of materials, as well as temperature and heat in their application to agricultural technology.</li> <li>4. The student will be able to apply physics concepts in the field of agricultural technology.</li> <li>5. The student will be able to understand the basic knowledge of applied physics for strengthening in following advanced engineering courses.</li> <li>6. The student will be able to understand and master the concepts of applied physics, then will be able to use these concepts to solve problems related to the field of agricultural technology.</li> </ol>
Content	<p>Some aspects discussed in this course are :</p> <ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Physical Quantities and Units</li> <li>3. Vectors and Scalars</li> <li>4. Distance and Displacement</li> <li>5. Motion of Objects</li> <li>6. Force and Mass</li> <li>7. Impulse and Momentum</li> <li>8. Work</li> <li>9. Energy</li> <li>10. Equilibrium and Statics</li> <li>11. Mechanical Properties of Materials</li> <li>12. Fluid Statics</li> <li>13. Fluid Dynamics</li> <li>14. Heat and Temperature</li> </ol>
Examination Forms	Formative test; Summative Tests; Journal Review; Project Tasks, Case Study.

Study and Examination Requirements	<p>Requirements for successfully passing the module</p> <ol style="list-style-type: none"> <li>1. Minimum attendance at lectures is 80%.</li> <li>2. Final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%).</li> <li>3. Minimum final score is 61% (“C”)</li> </ol>
Reading List	<ol style="list-style-type: none"> <li>1. Haliday dan Resnick. 1986. <i>Fisika (3<sup>rd</sup> ed. Jilid I)</i> Terjemahan Pantur Silaban dan Erwin Sucipto. Jakarta: Erlangga.</li> <li>2. Mandra, MAS. 2008. <i>Fisika Teknik 1</i>. Makassar: Badan Penerbit UNM.</li> <li>3. Giancoli, C., Douglas. 1997. <i>Fisika 1</i>. Terjemahan. Jakarta: Airlangga.</li> <li>4. Wavhal, D. 2017. <i>Applied Physics II for Science and Engineering</i>. SELF Publications, India.</li> <li>5. Rajesekar and Team. 2015. <i>Engineering Physics I and II</i>. Government of Tamilnadu.</li> </ol>

8	
Module designation (Code)	<b>Applied Chemistry(18B01C108)</b>
Semester (s) in which the module is taught	1
Person responsible for the module	1. Dr. Mohammad Wijaya, S.Si.,M.Si 2. ReskiPrajaja Putra, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture, Lab work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit ponits	2
Required and recommended prerequisites for joining the module	-
Module onjectives/intended learning outcomes	College students are expected to master the competency standards: 1. Able to explain macrochemical components contained in foodstuffs; their composition, structure, chemical reactions, functional properties, and physico-chemical properties. 2. Able to explain microchemical components contained in foodstuffs; their composition, structure, chemical reactions, functional properties, and physico-chemical properties. 3. Able to explain changes that occur as result of processing, handling and storage.
Content	1. <b>Introduction to Applied Chemistry</b> : understanding composition chemical in agricultural products and its damage due to chemical reactions (during processing and storage) 2. <b>Water and Ice</b> : water in food, water and ice structures, and physicochemical properties of water and ice 3. <b>Water and Ice</b> :Interaction of water with solutes, water activity and water vapor pressure, water absorption isotherm (ISA) and its relation to the durability of food 4. <b>Carbohydrate</b> : carbohydrates in agricultural products, classification, nomenclature, chemical structure, functional properties of monosaccharides 5. <b>Carbohydrate</b> :classification, nomenclature, chemical structure, functional properties of disaccharides and oligosaccharides, 6. <b>Carbohydrate</b> :classification, nomenclature, chemical structure, functional properties of polysaccharides 7. <b>Carbohydrate</b> :identification and chemical reactions of carbohydrates, modified starch (types and functional properties) 8. <b>Protein</b> :physicochemical properties, chemical structure of amino acids and proteins, classification of protein 9. <b>Protein</b> :denaturation, functional properties, and chemical reaction of protein 10. <b>Fats and Oils</b> :classification and nomenclature, types and physicochemical properties of fats and oils 11. <b>Fats and Oils</b> :chemical reactions and extraction process of fats and oils

	<p>12. <b>Vitamin</b> : classification of vitamin, water soluble vitamins, fat soluble vitamins</p> <p>13. <b>Vitamin</b> : physicochemical and functional properties, factors causing vitamin loss</p> <p>14. <b>Mineral</b> :macro and micro minerals, physicochemical, functional properties, and chemical reaction</p>
Examination Forms	Oral presentation, essay/multiple choices/ quizz/practical exam
Study and Examination Requirements	<p>Requirements for successfully passing the module;</p> <p>Minimum attendance of boths, lectures and practicum, is 80%;Students are required to pass practicum, with a minimum score of 85.</p> <p>The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)</p>
Reading List	<ol style="list-style-type: none"> <li>1. Winarno F.G. 2002. Kimia Pangan dan Gizi. Jakarta : Gramedia Pustaka Utama</li> <li>2. Fennema O.R. 1996. Food Chemistry Third Edition. New York : Marcel Dekker</li> <li>3. DeMan JM. 1999. Principles of Food Chemistry Third Edition. Maryland : Aspen Publisher, Inc</li> <li>4. Sikorski ZE., Kolakowska A. 2002. Chemical and Functional Properties of Food Lipids. CRC Press</li> <li>5. Walstra P. 2003. Physical Chemistry of Foods. Marcel Dekker, Inc</li> <li>6. Barsby TL., AM. Donald, PJ. Frazier. 2001. Starch Advances in Structure and Function. Royal Society of Chemistry</li> <li>7. Sikorski ZE. 2007. Chemical and Functional Properties of Food Component 3<sup>rd</sup>. CRC Press</li> <li>8. Szefer P., JO Nriagu. 2007. Mineral Component in Foods. CRC Press</li> </ol>

9	
Module designation	<b>Applied Biology(18B01C109)</b>
Semester (s) in which the module is taught	1
Person responsible for the module	1. Dr. Ir. Muhammad Wiharto, M.Si 2. Indrayani, S.Pi, M.Biotech.Stu, Ph.D 3. Diyahwati, S.TP., M.Pd
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture, lab work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. After learning activities, students are expected to be able to:</li> <li>2. Explain Food canning</li> <li>3. Explain Biology in Agriculture</li> <li>4. Explain GMP and HACCP (Hazard Analysis Critical Control Point)</li> <li>5. Explain Biology in the environmental field</li> <li>6. Explain Biology in the Health Sector</li> <li>7. Explain Benefits of beneficial microorganisms in industry</li> <li>8. Explain Fish morphology and anatomy, sexuality and the beginning of the fish life cycle</li> <li>9. Explain Definition of forest ecology, inecology, autecology. Ecology related to other sciences</li> <li>10. Explain Definition of ecosystem, basic ecosystem structure, productivity of biomass and various kinds of ecosystems</li> <li>11. Explain Competition and stratification, dependability relations</li> <li>12. Explain Understanding of succession, climax and understandings of climax</li> <li>13. Explain Competition and stratification, dependability relations</li> <li>14. Explain Physical environment and the relationship between the physical environment and tree species</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. Inroduction</li> <li>2. Food canning</li> <li>3. Biology in Agriculture.</li> <li>4. GMP and HACCP (Hazard Analysis Critical Control Point)</li> <li>5. Biology in the environmental field</li> <li>6. Biology in the Health Sector</li> <li>7. Benefits of beneficial microorganisms in industry</li> <li>8. Fish morphology and anatomy, sexuality and the beginning of the fish life cycle</li> </ol>



	<ol style="list-style-type: none"> <li>9. Definition of forest ecology, inecology, autecology. Ecology related to other sciences</li> <li>10. Definition of ecosystem, basic ecosystem structure, productivity of biomass and various kinds of ecosystems</li> <li>11. Competition and stratification, dependability relations</li> <li>12. Understanding of succession, climax and understandings of climax</li> <li>13. Competition and stratification, dependability relations</li> <li>14. Physical environment and the relationship between the physical environment and tree species</li> </ol>
Examination Forms	Formative test, Summative Test, Structured task and Quiz
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (15%), Quiz (20%) structured task (15%), midterm exam (25%) and final exam (25%)
Reading List	<ol style="list-style-type: none"> <li>1. Muhandri T. dkk., 2012. <i>Sistim Jaminan Mutu Industri Pangan</i>. IPB Press. Bogor.</li> <li>2. Slamet Sudarmaji dkk., 1998. <i>Analisa Bahan Makanan dan Pertanian</i>. Liberty. Yogyakarta.</li> <li>3. Winarno F.G., 2004. <i>Sterilisasi Pangan</i>. M-Brio Press. Bogor.</li> <li>4. _____, 2007. <i>Teknobiologi Pangan</i>. M-Brio Press. Bogor.</li> <li>5. _____, 2012. <i>HACCP (Hazard Analysis Critical Control Points) dan Penerapannya dalam Industri Makanan</i>. IPB Press. Bogor.</li> <li>6. Prihmantoro H dan Indriani Y.H., 1999. <i>Hidroponik Sayuran Semusim untuk Bisnis dan Hobi</i>. Penebar Swadaya. Jakarta.</li> <li>7. Rubatzky, V.E., 1998. <i>Sayuran Dunia I. Prinsip, produksi &amp; gizi</i>. Edisi kedua. Penerbit ITB. Bandung.</li> <li>8. Sastrawijaya T., 2000. <i>Pencemaran Lingkungan</i>. Rineka Cipta. Jakarta</li> <li>9. Barbour M.G., J.H. Burk &amp; W.D. Pitts., 1987. <i>Terrestrial Plant Ecology</i>. 2.nd.eds. the Benjamin/Cummings publishing Company, Inc. Menlo Park, California.</li> <li>10. Hunter M &amp; Gibbs J, 2007. <i>Fundamentals of Conservation Biology</i>. Third edition. Blackwell Publishing.</li> </ol>

10	
Module designation (Code)	<b>Islamic Religion Education(18B01C201)</b>
Semester (s) in which the module is taught	2
Person responsible for the module	Nurmila, S.Ag., M.Pd.I
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Able to explore the philosophical and theological foundations of Islamic religious education in universities.</li> <li>2. Able to explore the characteristics and urgency of spirituality and explore sociological, philosophical, theological, and historical sources of the concept of divinity.</li> <li>3. Able to explore the concept and implementation of monotheism in religion.</li> <li>4. Exploring the concept of a trilogy of religions in Islam (Iman, Islam, and Ihsan) and building arguments about the characteristics of human beings.</li> <li>5. Able to explore the basic concepts of the Qur'an, Sunnah and ijihad.</li> <li>6. Able to explore variations in understanding and practice of religion and build arguments about the urgency and methods of grounding the Qur'an.</li> <li>7. Able to explore Islamic concepts of plurality, tolerance, and multiculturalism.</li> <li>8. Able to develop arguments about the compatibility of Islam in facing challenges in the modern world.</li> <li>9. Able to trace traces of the treasures of Islamic civilization and its contribution to world civilization.</li> <li>10. Able to build arguments about the urgency and function of the campus mosque as a cultural center.</li> <li>11. Able to review the basic concepts of Islam and its implementation in multiple contexts.</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. How to Study Islam in College.</li> <li>2. How Man Is God.</li> <li>3. How Religion Guarantees Happiness.</li> <li>4. How to Integrate Faith, Islam, and Ihsan in Forming Insan Kamil.</li> <li>5. Moral and Moral Ethics</li> <li>6. How to Build a Qur'anic Paradigm for Modern Life.</li> <li>7. How to Ground Islam in Indonesia.</li> <li>8. How Islam Builds Unity in Diversity.</li> <li>9. Science and Technology in Islamic View</li> <li>10. Zakat and taxes in Islam</li> <li>11. How Islam Faced the Challenges of Modernization.</li> <li>12. How is the Contribution of Islam in the Development of World Civilization.</li> <li>13. How to Develop Islamic Culture through the</li> </ol>

	Campus Mosque. 14. Islam Rahmatan Lil Alamin
Examination Forms	written test, oral test, portfolio
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on Individual task (20%), Group task (20%), Midterm exam (30%), Final exams (30%)
Reading List	<ol style="list-style-type: none"> <li>1. Al Qur'anul Karim and its translation, Ministry of Religion of the Republic of Indonesia.</li> <li>2. Textbooks, Islamic Religious Education for Higher Education, Issue I, Kemenristekdikti, Jakarta, 2016.</li> <li>3. Textbooks, Islamic Religious Education at Public Universities, Ministry of Religion, Jakarta, 2004.</li> <li>4. Kitab Bulughul Maram, Akbar Media Publisher, Jakarta.</li> <li>5. The Book of Fiqh Sunnah, Pen Pundi Aksara Publisher, Jakarta, 2006.</li> <li>6. The book of Riyadhus Shalihin, Amani Library Publisher, Jakarta, 1999.</li> <li>7. Summary of Sahih Bukhari, Gema Insani Press Publisher, Jakarta.</li> <li>8. Summary of Sahih Muslim, Insan Kamil Publisher, Jakarta.</li> <li>9. Tafsir Ibnu Katsir, Gema Insani Press Publisher, Jakarta, 2000.</li> <li>10. Other Islamic books.</li> </ol>

11	
Module designation (Code)	<b>Indonesian Language(18B01C202)</b>
Semester (s) in which the module is taught	2
Person responsible for the module	Dr. Anita Candra Dewi, S.Pd., M.Pd
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. Contextual Teaching Learning (CTL)</li> <li>3. Small Group Discussion (SGD)</li> <li>4. Project Based Learning (PBL)</li> </ol>
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Students are able to explain the history of Indonesian language development</li> <li>2. Students are able to explain various spoken and written languages according to context</li> <li>3. Students are able to classify diction or word choices based on the topic of the essay</li> <li>4. Students are able to show writing that is not in accordance with Enhanced Spelling</li> <li>5. Students are able to compose effective, logical, and rule-based mathematical sentences</li> <li>6. Students are able to develop academic paragraphs</li> <li>7. Students are able to apply reasoning in organizing essays</li> <li>8. Students are able to apply scientific paper conventions</li> <li>9. Students are able to make a simple scientific framework</li> <li>10. Students are able to compile citations and bibliography</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. History of the development of the Indonesian language</li> <li>2. Variety of Indonesian</li> <li>3. Improved Spelling</li> <li>4. Diction or word choice</li> <li>5. •Effective sentence</li> <li>6. Paragraph</li> <li>7. Reasoning in essays</li> <li>8. Topic of essay</li> <li>9. Scientific work framework</li> <li>10. Bibliography and citations</li> </ol>
Examination Forms	Oral presentation/essay/multiple choices/ quizz
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (15%), Quiz (20%) structured task (15%), midterm exam (25%) and final exam (25%)
Reading List	<ol style="list-style-type: none"> <li>1. Dalman. 2014. Writing Skills. Jakarta: Raja Grafindo Persada.</li> <li>2. Ermanto&amp;Emidar. 2018. Indonesian Language: Personality Development in Higher Education. Depok: Rajawali Press.</li> <li>3. H., Ahmad P. and Alek. 2016. Indonesian for Higher Education: Substance of Study and Its</li> </ol>

	<p>Application. Jakarta: Erlangga Publisher.</p> <ol style="list-style-type: none"><li data-bbox="810 226 1404 315">4. Nugraheni, Aninditya Sri. 2017. Indonesian Language in Higher Education: Based on Active Learning. Jakarta: Kencana.</li><li data-bbox="810 320 1404 434">5. Satata, Sri, et al. 2012. Indonesian Language: Personality Development Course for Academic Writing in Higher Education. Jakarta: MitraWacana Media.</li></ol>
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12	
Module designation (Code)	<b>Introduction to Vocational Education(18B01C203)</b>
Semester (s) in which the module is taught	2
Person responsible for the module	1. Dr. Muhammad Rais, S.Pd., MP., MT 2. Khaidir Rahman, S.Pd., M.Pd 3. Ervi Novitasari, S.Pd., M.Pd
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	Students can: 1. Explain the meaning of vocational education 2. Explain the meaning and function of vocational education 3. Describe the history of vocational education 4. Describe the streams of vocational education 5. Describe the philosophical basis, conceptual principles, and characteristics of vocational education 6. Identifying vocational education problems 7. Describe the national education system (8 education standards) 8. Describe the models of vocational education delivery 9. Describe the basic components in vocational education according to the development of vocational education in the era of the industrial revolution 4.0 10. Describe vocational education innovations in the industrial revolution 4.0 11. Describe the vocational learning methodology 12. Explain the concept of the vocational curriculum and the Indonesian National Qualifications Framework (KKNI) 13. Describe the interconnection of vocational education with the world of work 14. Implement vocational education career guidance
Content	1. Definition of education and vocational education 2. Meaning and function of vocational education 3. History of Vocational Education 4. Schools of education 5. Philosophical underpinnings, conceptual principles, and characteristics of vocational education 6. Vocational education problems 7. National education system 8. Vocational education delivery models 9. The basic components in vocational education are in accordance with the development of vocational

	<p>education in the era of the industrial revolution 4.0</p> <ol style="list-style-type: none"> <li>10. Vocational education innovations in the industrial revolution 4.0</li> <li>11. Vocational learning methodology</li> <li>12. Vocational Curriculum and KKNI</li> <li>13. Interconnection of vocational education with the world of work.</li> <li>14. Vocational education career guidance</li> </ol>
Examination Forms	Formative test; Summative Tests; Journal Review; Project Tasks
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments 30%), active discussion (10%), midterm exam (20%) and final exam (40%)
Reading List	<ol style="list-style-type: none"> <li>1. Maslam Bukit (2014). Strategi dan Inovasi Pendidikan Kejuruan. Bandung: Alfabeta.</li> <li>2. Putu Sudira (2012). Filosofi &amp; Teori Pendidikan Vokasi dan Kejuruan. Yogyakarta: UNY Press</li> <li>3. Putu Sudira (2020). Paradigma Baru Pembelajaran Vokasional Era Revolusi Industri 4.0. NY. Press</li> <li>4. Metodologi (2018). Pembelajaran Vokasional Abad XXI. UNY. Press</li> <li>5. Basuki Wibowo. (2005). Pendidikan teknologi dan kejuruan. Surabaya: Kertajaya Duta Media.</li> <li>6. Dedi Supriyadi (Ed.). (2002). <i>Sejarah Pendidikan Teknik dan Kejuruan Indonesia: Membangun Manusia Produktif</i>. Jakarta: Direktorat Pendidikan Menengah Kejuruan, Direktorat Jenderal Pendidikan Dasar dan Menengah, Departemen Pendidikan Nasional.</li> <li>7. Nolker, H., dan Schoenfeldt, E. 1983. <i>Pendidikan Kejuruan : Pengajaran, Kurikulum, dan Perencanaan</i>. Terjemahan Agus Setiadi. Jakarta : PT. Gramedia.</li> <li>8. Pavlova, M. (2009). <i>Technology and vocational education for sustainable development: Empowering individuals for the future</i>. Australia: Springer.</li> <li>9. Ralph Catts, Lan Falk, Ruth Wallace (2011) Vocational learning inovatif teory and practice. Springer. Landon New York.</li> </ol>

13	
Module designation (Code)	<b>Biochemistry of Agricultural Products(18B01C204)</b>
Semester (s) in which the module is taught	2
Person responsible for the module	1. Dr. Andi Sukainah, S.TP., M.Si 2. Indrayani, S.Pi., M.Biotech.Stu., Ph.D 3. ReskiPrajaja Putra, S.TP., M. Si 4. AmiruddinHambali, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture, Lab work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit ponits	2
Required and recommended prerequisites for joining the module	-
Module onjectives/intended learning outcomes	College students are expected to master the competency standards: 1. Able to explain the mechanism of enzymatic and non-enzymatic browning reactions along with the inhibition of their reactions 2. Able to explain biochemical changes in meat, fish and poultry, both, from muscle properties and muscle conversion during pascamortem, rigor mortis, changes in meat and muscle protein, and post-rigor tenderness. 3. Able to explain the biochemical changes of fruit and vegetables which consist of respiration, ethylene mechanism, changes in color, texture, taste,biological and microbiological damage to vegetable. 4. Able to explain the mechanism of carbohydrate metabolism (glycolysis, gluconeogenesis, glycogenolysis, glycogenesis), catabolism and anabolism reactions of protein and fat (oil) and their relation to the citric acid cycle.
Content	1. <b>Introduction to Biochemistry of Agricultural Product</b> : biochemical coverage of agricultural products 2. <b>Reaction Browning Food</b> : enzymatic browning (reaction mechanism, phenolase and phenolase substrate); phenolase in food and food processing 3. <b>Digestion of agricultural products in the body</b> :digestion in the mouth, stomach, intestine, and the end result of digestion of food 4. <b>Changes in Biochemistry of Meat</b> :properties of muscles (structure and muscle contraction) 5. <b>Changes in Biochemistry of Meat</b> :timerigormortis; changes in meat protein and muscle protein (myofibriler and sarcoplasmik) 6. <b>Changes in Biochemistry of Fish</b> :properties of muscles (structure and muscle contraction); time rigormortis; changes in fish protein and muscle protein (myofibrillary and sarcoplasmic) 7. <b>Changes in Biochemistry of Poultry</b> : properties of muscles (structure and muscle contraction); time rigormortis; changes in poultry protein and muscle protein (myofibriler and sarcoplasmik) 8. <b>Changes in Biochemistry of Fruits and Vegetables</b> :respiration in fruits and vegetables;



	<p>initiation of the ripening process</p> <p>9. <b>Changes in Biochemistry of Fruits and Vegetables</b> :relationship between ethylene production and respiration, influence of oxygen and carbon dioxide; change the color of fruits and vegetables</p> <p>10. <b>Changes in Biochemistry of Tubers, Cereals and Legumes</b> :respiration of tubers, cereals and legumes; change in the color of tubers, cereals and legumes</p> <p>11. <b>Glycolysis and Gluconeogenesis</b> :glycolysis and gluconeogenesis</p> <p>12. <b>Glycogenesis, Glycogenolysis, and The Citric Acid Cycle</b> :glycogenesis; glycogenolysis; citric acid cycle</p> <p>13. <b>Fat Metabolism</b> :fat transport; oxidation of saturated and unsaturated fatty acids; fatty acid synthesis</p> <p>14. <b>Protein and Amino Acid Metabolism</b> :breakdown of protein in the body; amino acid metabolism reactions; formation of acetyl coenzyme A; urea cycle; protein biosynthesis</p>
Examination Forms	Oral presentation/essay/multiple choices/quizz/practical exam
Study and Examination Requirements	<p>Requirements for successfully passing the module;</p> <p>Minimum attendance of boths, lectures and practicum, is 80%; Students are required to pass practicum, with a minimum score of 85.</p> <p>The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)</p>
Reading List	<ol style="list-style-type: none"> <li>1. Lehninger AL. 1993. Dasar-Dasar Biokimia. Jilid 1. Thenawidjaja M, penerjemah; Jakarta : Erlangga. Terjemahan dari : Principles of Biochemistry.</li> <li>2. Lehninger AL. 1990. Dasar-Dasar Biokimia. Jilid 2. Thenawidjaja M, penerjemah; Jakarta : Erlangga. Terjemahan dari : Principles of Biochemistry.</li> <li>3. Lehninger AL. 1994. Dasar-Dasar Biokimia. Jilid 3. Thenawidjaja M, penerjemah; Jakarta : Erlangga. Terjemahan dari : Principles of Biochemistry.</li> <li>4. Gilbert, HF. 2000. Basic Concepts In Biochemistry A Student's Survival Guide, 2<sup>nd</sup>. New York : McGraw-Hill</li> <li>5. Simpson BK. 2012. Food Biochemistry and Food Processing, 2<sup>nd</sup>. USA : Wiley-Blackwell</li> <li>6. Hui YH., WK. Nip, LML Nollet, G. Paliyath, BK. Simpson. 2006. Food Biochemistry and Food Processing. Blackwell Publishing</li> <li>7. O'Brien J., HE. Nursten, MJC. Crabbe, JM. Ames. 2005. The Maillard Reaction in Food and Medicine. Woodhead Publishing Limited</li> </ol>

14	
Module designation (Code)	<b>Engineering Mechanics (18B01C205)</b>
Semester (s) in which the module is taught	2
Person responsible for the module	1. Dr. Jamaluddin P, MP. 2. Reski Febyanti Rauf, S.TP.M.Si. 3. Nunik Lestari, S.T.P., M.Si 4. Andi Muhammad AkramMukhlis, S.T., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture, lab work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	Applied Physics, engineering mathematics
Module objectives/intended learning outcomes	1. Students are able to explain the concept of engineering mechanics 2. Students are able to explain and analyze the static forces acting on rigid objects 3. Students are able to explain and analyze dynamic forces on moving objects 4. Students are able to analyze and solve problems in case studies involving engineering mechanics concepts 2. 5. Students are able to use the principles of engineering mechanics to design technological products related to the field of agricultural technology teknologi
Content	Some aspects discussed in this course are : 1. Force vectors 2. Equilibrium of a particle : two-dimensional 3. Equilibrium of a particle : three-dimensional 4. Equilibrium of a Rigid Body : two-dimensional 5. Equilibrium of a Rigid Body : three-dimensional 6. Moment and couple 7. Structural Analysis 8. Internal Loadings Developed in Structural Members 9. Shear and Moment Equations and Diagrams 10. Friction 11. Moments of Inertia
Examination Forms	Essay/quizz/ Practical exam
Study and Examination Requirements	Requirements for successfully passing the module 1. Minimum attendance at lectures is 80%. 2. Final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%). 3. Minimum final score is 61% ( "C" )
Reading List	1. Meriam, J. L., & Kraige, L. G. (2002). Engineering mechanics: statics (Vol. 1). John Wiley & Sons. 2. Meriam, J. L., & Kraige, L. G. (2012). Engineering mechanics: dynamics (Vol. 2). John Wiley & Sons. 3. Hibbeler, R. C. (2013). Engineering Mechanics :

	<p>Statics. Thirteenth Edition. Pearson Education, Inc.</p> <p>4. Nelson, E. W., Best, C.L., McLean, W.G. (1998). Schaum's outline of theory and problems of engineering mechanics, statics and dynamics. McGraw-Hill</p>
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15	
Module designation (Code)	<b>Occupational Safety and Health Management System(18B01C206)</b>
Semester (s) in which the module is taught	2
Person responsible for the module	1. Dr. Yasdin, S.Pd., M.Pd 2. Reski Febyanti Rauf, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. The student will be able to identify various kinds work accidents, various kinds of preventive measures work accident</li> <li>2. The student will be able to understand the scope of occupational safety and health</li> <li>3. The student will be able to understand work steps according to the applicable operational standards</li> <li>4. The student will be able to understand occupational safety and health tools and equipment in agricultural workshops</li> <li>5. The student will be able to understand the occupational health and safety management system in agriculture</li> </ol>
Content	<p>Some aspects discussed in this course are :</p> <ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Policies and regulations for occupational health and safety management systems in Indonesia</li> <li>3. The concept of occupational health and safety</li> <li>4. Accident prevention principles and methods</li> <li>5. Work accidents in industry</li> <li>6. Work accident analysis</li> <li>7. Industrial hygiene and sanitation</li> <li>8. Occupational illness</li> <li>9. Personal protective equipment</li> <li>10. Occupational health and safety in agriculture</li> <li>11. Chemical handling safety</li> <li>12. Fire hazard protection</li> <li>13. Danger of work accidents for agricultural equipment and machinery</li> <li>14. Danger of accidents in animal handling</li> </ol>
Examination Forms	Formative test; Summative Tests; Journal Review; Project Tasks, Case Study.
Study and Examination Requirements	<p>Requirements for successfully passing the module</p> <ol style="list-style-type: none"> <li>1. Minimum attendance at lectures is 80%.</li> <li>2. Final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%).</li> <li>3. Minimum final score is 61% ( "C" )</li> </ol>
Reading List	1. ILO. 2011. Safety and Health in Agriculture. ILO

	<p>code of practice. Geneva</p> <ol style="list-style-type: none"><li>2. Roger L Braurer. 2006. Safety, and Health for Engineers. New York: John Wiley &amp; Sons, Inc.</li><li>3. Silalahi, B.N.B. dan Silalahi, R.B. 1991. Manajemen Keselamatan dan Kesehatan Kerja. Jakarta: PT Pustaka Binaman Pressindo</li><li>4. Harrington, J.M. &amp; F.S. Gill, 2003, Kesehatan Kerja, EGC, Jakarta</li><li>5. Achadi Budi Cahyono, 2004, Keselamatan Kerja Bahan Kimia di Industri, Gadjah Mada University Press</li><li>6. Rudi Suardi, 2005, Sistem Keselamatan &amp; Kesehatan Kerja, Jakarta, Penerbit PPM</li></ol>
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16	
Module designation (Code)	<b>Agricultural Workshop(18B01C207)</b>
Semester (s) in which the module is taught	2
Person responsible for the module	<ol style="list-style-type: none"> <li>1. Dr. Jamaluddin P, MP</li> <li>2. Andi Muhammad Akram Mukhlis, ST., M.Si</li> <li>3. Khaidir Rahman, S.Pd., M.Pd</li> <li>4. Muhammad Rizal, S.TP., M.Si</li> </ol>
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture, lab work
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Students are able to explain the basic concepts of using agricultural workshops (P4)</li> <li>2. Students are able to explain and explain about workshop equipment and its functions (S10)</li> <li>3. Students are able to apply every workshop equipment (KU3)</li> <li>4. Students are able to use workshop equipment according to its application (S3 and KK1)</li> <li>5. Students are able to analyze and solve problems in case studies involving workshops(KU3 and KK1)</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Basic equipment for workshop and inventory</li> <li>3. Workshop management</li> <li>4. K3 at the workshop</li> <li>5. Basic knowledge of metal construction materials</li> <li>6. Basic knowledge of agricultural robotics workshops</li> <li>7. The main and supporting equipment for agricultural robotics workshops</li> <li>8. Measuring tool</li> <li>9. Sheet metal working</li> <li>10. Fasteners and thread making</li> <li>11. Drilling</li> <li>12. Cutting and refining</li> <li>13. Welding</li> </ol>
Examination Forms	Formative test; Summative Tests; Journal Review; Project Tasks, Case Study.
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (15%), Quiz (20%) structured task (15%), midterm exam (25%) and final exam (25%)
Reading List	<ol style="list-style-type: none"> <li>1. Ray v, Herren. 2018. Agricultural Mechanics: Fundamentals and Applications. United States of America.</li> <li>2. SCBD.2017. Pedoman Pelaksanaan Keselamatan dan Kesehatan Kerja. PT Danayasa Arthatama Tbk: Jakarta</li> </ol>

17	
Module designation (Code)	<b>Engineering Drawing(18B01C208)</b>
Semester (s) in which the module is taught	2
Person responsible for the module	1. Nunik Lestari., S.T.P,M.Si 2. Andi Muhammad Akram Mukhlis, ST., M.Si 3. Muhammad Rizal, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Compulsory to all study programmes
Teaching methods	Lecture, lab work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Students are able to master the concept of engineering depiction correctly (P1, KK3).</li> <li>2. Students are able to take geometric measurements of a product for the purposes of making technical drawings (P1, KK3)</li> <li>3. Students are able to read technical drawings of a product for further purposes in the scope of agricultural technology, such as design, quality control, and process planning (S5, KU3)</li> <li>4. Students are able to make technical drawings of a product either manually or with drawing software (KK3, S5).</li> <li>5. Students are able to analyze and solve problems involving technical drawings (KU3, S5).</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. The functions and properties of the image as an engineering material</li> <li>3. Drawing tools and their use</li> <li>4. Lines and letters in pictures</li> <li>5. Shading</li> <li>6. Image of pictorial projection technique</li> <li>7. Drawing orthogonal projection technique</li> <li>8. Cut (slices)</li> <li>9. Dimensions</li> <li>10. Solidwork application installation</li> <li>11. Introduction of solidwork applications</li> <li>12. 2D and 3D modeling</li> <li>13. Assembling 3D model (Assembly)</li> <li>14. Drawing 2D and 3D</li> <li>15. Basic animation of solidwork</li> </ol>
Examination Forms	Formative test; Summative Tests; Journal Review; Project Tasks, Case Study.
Study and Examination Requirements	Requirements for successfully passing the module Minimum attendance at lectures is 80%. Final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%). Minimum final score is 61% ( "C" )

Reading List	<p>Utama:</p> <p>G. Takeshi Sato dan N. Sugiarto Hartanto. 2005. Menggambar Mesin menurut Standar ISO, cetakan kesebelas. Pradnya Paramita. Jakarta.</p> <p>Pendukung:</p> <ol style="list-style-type: none"><li>1. Anwari. 1978. Menggambar Mesin. Departemen Pendidikan dan Kebudayaan.</li><li>2. Kristie Plantenberg. 2010. Engineering Graphics Essentials with Autocad 2011 Instruction.</li><li>3. Robbi. 2012. Solidworks Professional. Penerbit Informatika. Bandung.</li></ol>
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18	
Module designation (Code)	<b>Student Development(18B01C301)</b>
Semester (s) in which the module is taught	3
Person responsible for the module	1. Dr. Muhammad Rais, S.Pd., MP., MT 2. Khaidir Rahman, S.Pd., M.Pd 3. ErviNovitasari, S.Pd., M.Pd
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	Students can: 1. Describe precisely the nature of growth and development 2. Describe precisely the law or principles of development 3. Describe the individual and its development aspects 4. Explain the concept of intelligence and talent 5. Accurately describe Multiple Intelligence according to Howard Gardner 6. Describe precisely emotional intelligence (EQ) according to Daniel Goleman 7. Piaget's precise description of cognitive development 8. Describes precisely the development of language according to Vigotsky 9. To accurately describe the moral and spiritual development of learners according to Kohlberg 10. Describing precisely psychosocial development according to Erikson 11. Describe the development tasks of students accurately 12. Identify appropriately the development tasks of learners 13. Analyze students' misbehave 14. Develop misbehave intervention strategies in students
Content	1. The Nature of Growth and Development 2. Law or Principles of Development 3. Individuals and their Developmental Aspects 4. Multiple Intelligence 5. Emotional Intelligence (EQ) 6. Cognitive Development 7. Language Development 8. Moral and Spiritual Development 9. Social Development 10. Student Development Tasks 11. Student Problems and Intervention Strategies

Examination Forms	Formative test; Summative Tests; Journal Review; Video Review. Project Tasks
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments 40%), active discussion (10%), midterm exam (20%) and final exam (30%)
Reading List	<ol style="list-style-type: none"> <li>1. Triyono, dkk. 2012. <i>Perkembangan Peserta Didik</i>. Malang: Universitas Negeri Malang</li> <li>2. Yusuf. S.L.N. 2012. <i>Perkembangan Peserta Didik</i>. Jakarta: Rajawalipress</li> <li>3. Santrok, J.W. 2002. <i>Life- Span Development. Perkembangan Masa Hidup</i>. Alih Bahasa oleh Juda Damanik, Achmad Chusairi. Jakarta: Erlangga.</li> <li>4. Djiwandono, S.E.W. 2002. <i>Psikologi Pendidikan</i>. Jakarta: Grasindo</li> <li>5. Hurlock. E.B. 1991. <i>Psikologi Perkembangan Suatu Pendekatan Sepanjang Rentang Kehidupan</i>. Terjemahan oleh Istiwidayanti, dkk.Jakarta: Erlangga</li> <li>6. Gardner, H. 1993 <i>Frames of Mind: The Theory of Mutiple Intelegence</i>. London: Bombury Publishing. Inc</li> <li>7. Sumandi, I., Marthen, P &amp; Hur. H. 2000. <i>Perkembangan Peserta Didik</i>. Malang: FIP Universitas Negeri Malang.</li> <li>8. Goleman, D. 1995. <i>Emotional Intelegence</i>. New York. Batam</li> </ol>

19	
Module designation (Code)	<b>Learn and Learning(18B01C302)</b>
Semester (s) in which the module is taught	3
Person responsible for the module	1. Dr. Muhammad Rais, S.Pd., MP., MT 2. Diyahwati, S.TP., M.Pd 3. Khaidir Rahman, S.Pd., M.Pd 4. ErviNovitasari, S.Pd., M.Pd
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	1. Explain the concepts of learning, learning, Teaching and Education 2. Describe the types of learning and the characteristics of teaching and learning 3. Describe problems in learning 4. Outlines the principles of learning 5. Describe teaching and learning theories 6. Apply the use of learning resources 7. Practicing basic teaching skills 8. Analyze learning cases in the field
Content	1. Concept of learning, learning, teaching and education 2. Types of learning and characteristics of teaching and learning 3. Learning problems 4. Learning principles 5. Behavioristic learning theory 6. Humanistic learning theory 7. Sociocultural learning theory 8. Constructivist learning theory 9. Basic teaching skills 10. Utilization of learning resources in learning 11. Analyze the implementation of field learning theories 12. Understand and analyze learning cases in the field
Examination Forms	Formative test; Summative tests; Journal Review; Film Review; Project Tasks
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments 35%), active discussion (15%), midterm exam (25%) and final exam (25%)
Reading List	1. Baharuddin. H. (2010), <i>Teori Belajar dan Pembelajaran</i> . Jogyakarta : Ar-Ruzz 2. Budiningsih, Asri. 2003. <i>Belajar dan Pembelajaran</i> . Yogyakarta: Fakultas Ilmu Pendidikan, Universitas Negeri Yogyakarta. 3. Gagne, R.M. (1997). <i>Conditioning of Learning</i> ,

	<p>New York: Holt Rinehart and Winston.</p> <ol style="list-style-type: none"><li>4. Hamalik, Oemar. (2001), <i>Proses Belajar Mengajar</i>. Bandung: Bumi Aksara</li><li>5. Hamzah B. Uno, Herminarto Sofyan, Susardjo Atmowidjojo. 2012. <i>Landasan Pembelajaran Teori dan Praktik</i>. Gorontalo: Nurul Jannah.</li><li>6. Moll, Luis C. (1993). <i>Vygotsky &amp; Education Instructional Implications and Applications of socio historical psychology</i>. Australia : Cambridge University Press.</li></ol>
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20	
Module designation (Code)	<b>Educational Psychology(18B01C303)</b>
Semester (s) in which the module is taught	3
Person responsible for the module	1. Dr. Muhammad Rais, S.Pd., MP., MT 2. Ervi Novitasari, S.Pd., M.Pd 3. Khaidir Rahman, S.Pd., M.Pd
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	Students can: 1. Explain the meaning, history, scope of the psychology of learning 2. Describe learning theories and practices in learning 3. Describe the activities and factors that influence learning 4. Understand the characteristics of maturity and their effect on readiness 5. Describe the characteristics of learners and the environment and their effects on learning achievement 6. Describe active learning models and their application in schools 7. Describe the ideal teacher profile with a psychological approach
Content	1. Definition of Learning psychology 2. History, scope, and methods of Learning psychology 3. The behavior theory of Thorndike, Ivan Pavlov, Bruner, Watson, and Skinner's 4. The cognitive theory of Jerome Bruner and David Ausubel's 5. The constructivist theory of Vigotsky. Piaget 6. The humanistic theory of Arthur Combs, Maslow, and Rogers 7. Factors affecting learning 8. The characteristics of intellectual maturity 9. Effect of maturity on readiness 10. Transfer of learning and factors that play a role in learning 11. Understanding learner characteristics, learning environment, and learning achievement 12. Active teaching models and ways of implementing them 13. Teacher personality characteristics 14. Teacher professional competence (cognitive, affective, psychomotor) 15. The functions and types of teachers in the teaching

	and learning process
Examination Forms	Formative test; Summative Tests; Journal Review; Film Review; Project Tasks
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments 30%), active discussion (10%), midterm exam (20%) and final exam (30%)
Reading List	<ol style="list-style-type: none"> <li>1. Ausubel. David. 1998. Psikologi of Learning</li> <li>2. Gagne, Robert. 1997. Kondisi Belajar dan Teori Pembelajaran Terjemahan Munandir. Jakarta: Depdikbud Dirjen Pendidikan Tinggi</li> <li>3. Winkel. 2010. Psikologi Pengajaran. Gramedia: Jakarta</li> <li>4. Santrok, W John. 2009. Psikologi Pendidikan. Kencana Prenada Media Group. Jakarta</li> </ol>

21	
Module designation	<b>Fundamental of Agricultural Cultivation(18B01C304)</b>
Semester (s) in which the module is taught	3
Person responsible for the module	1. Ratnawaty Fadilah, S.TP., M.Sc 2. Nunik Lestari, S.T.P., M.Si 3. Andi Muhammad AkramMukhlis, ST., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit ponits	2
Required and recommended prerequisites for joining the module	-
Module onjectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Able to understand the condition of Indonesian agriculture and the history of Indonesian Agricultural Cultivation</li> <li>2. Able to understand the problems, challenges, and advances in Indonesian agricultural technology in the era of globalization</li> <li>3. Able to understand the Basics of Agricultural Cultivation</li> <li>2. Able to understand food crop cultivation starting from land preparation, land management, soil quality, plant nutrition, seeding, planting, land maintenance, plant growth phase, pest and plant disease control to harvesting</li> </ol>
Content	This course will develop the ability, knowledge and skills of plant cultivation. Through this course, students will better understand techniques in agricultural cultivation and the scope of agricultural cultivation which includes land preparation, land management, soil ecology, plant nutrition, seed selection, maintenance, pest, disease and weed control, plant growth phases, crop requirements for growing, harvesting and post-harvest techniques for food crops
Examination Forms	Essay, quiz, study case
Study and Examination Requirements	<p>Requirements for successfully passing the module</p> <ol style="list-style-type: none"> <li>1. Minimum attendance at lectures is 80%.</li> <li>2. Final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%).</li> <li>3. Minimum final score is 61% ( "C" )</li> </ol>
Reading List	<ol style="list-style-type: none"> <li>1. I Nyoman Rai. 2018. Dasar- Dasar Agronomi. Penerbit Pelawa Sari. Denpasar</li> <li>2. Prof. Dr. H. Zulkarnain. 2009. Dasar- Dasar Hortikultura. Bumi Aksara Jakarta</li> <li>3. Chandra Shekara et al., 2016. Farmers's Handbook on Basic Agriculture. Desai Fruits &amp; Vegetables Pvt. Ltd. India</li> <li>4. Aqleem Abbas., 2011. Introduction of Agriculture. The University of Agriculture Peshawar Pakistan</li> </ol>

22	
Module designation (Code)	<b>Thermodynamics/Heat Transfer(18B01C305)</b>
Semester (s) in which the module is taught	3
Person responsible for the module	1. Dr. Jamaluddin P., MP 2. Nunik Lestari, S.T.P., M.Si 3. Reski Febyanti Rauf, S.TP., M.Si 4. Andi Muhammad Akram Mukhlis, ST., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	Applied Physics, Engineering Mechanics
Module objectives/intended learning outcomes	1. The student will be able to understand the concepts and basic principles of heat transfer and thermodynamics and their calculations. 2. The student will be able to understand the process of heat transfer by conduction, convection and radiation and their calculations. 3. The student will be able to understand the mass transfer process and its calculations.
Content	Some aspects discussed in this course are : 1. Introduction 2. Thermodynamics Basic Concepts and Principles 3. Heat Transfer Basic Concepts and Principles 4. The Properties of The Substance 5. Conduction 6. Applications and Equations of Conduction Process 7. Convection 8. Applications and Equations of Convection Process 9. Radiation: Applications and Equations 10. Boiling and Condensation 11. Heat Exchanger 12. Heat Loss 13. Mass Transfer 14. Applications of heat and mass transfer
Examination Forms	Formative test; Summative Tests; Journal Review; Project Tasks, Case Study
Study and Examination Requirements	Requirements for successfully passing the module 1. Minimum attendance at lectures is 80%. 2. Final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%). 3. Minimum final score is 61% ( "C" )
Reading List	1. Yunus A. Cengel and Michael Boles. 1994. <i>Thermodynamics An Engineering Approach</i> , Second Edition, McGraw-Hill, Inc. 2. Paul A Tipler.1991. <i>Physics for Scientist and Engineers</i> , Third Edition, Worth Publisher, Inc. 3. Khuriati A. 2007. <i>Termodinamika</i> . Jurusan Fisika, FMIPA, Univerisitas Diponegoro.



	<ol style="list-style-type: none"><li>4. Susastriawan AAP. 2011. <i>Perpindahan Panas dan Massa: Konduksi</i>. Institut Sains dan Teknologi AKPRIND.</li><li>5. Hamid AA. 2007. <i>Kalor dan Termodinamika</i>. Jurusan Fisika, FMIPA, Universitas Negeri Yogyakarta.</li><li>6. Al-Shemmeri T. 2010. <i>Engineering Thermodynamics</i>. Tarik Al-Shemmeri &amp; Ventus Publishing ApS: UK.</li></ol>
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23	
Module designation (Code)	<b>Fish Hatchery Technology(18B01C306)</b>
Semester (s) in which the module is taught	3
Person responsible for the module	1. Prof. Dr. Patang, S.Pi., M.Si 2. Dr. ErnawatiSyahrudinKaseng, S.Pi., M.Si 3. Amirah Mustarin, S.Pi., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture, lab work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	Students are able to explain various methods of fish hatchery and apply the methods of hatching freshwater fish, brackish water fish and seawater fish
Content	1. The meaning and role of reproductive organs, endocrine glands, hormones, neurohormones, pheromones in the fish reproduction process; 2. External and internal stimulation to stimulate fish to spawn; 3. The process of sperm insemination, embryo development from division to hatching treatment of larvae into seeds; 4. Hatching freshwater fish, brackish water fish and seawater fish designing a fish hatchery business.
Examination Forms	Oral presentation/essay/multiple choices/quizz/practical exam/assignments
Study and Examination Requirements	Requirements for successfully passing the module; Minimum attendance of boths, lectures and practicum, is 80%; The learning outcomes assessment consists of midterm exams (30%), final exams (40%), assignments (10%), practicum (20%)
Reading List	1. Alaerts, G. dan Santika, S.S. (1984). Water Research Methods. Usaha Nasional. Surabaya 2. Anastasya R. 2010. Regulation and Reproductive System. 3. Affandi, R., Tang, U. M. 2002. <i>Aquatic Animal Physiology</i> . Unri Press. Riau. 4. Djarijah, Abbas Siregasr. 2001. Carp Hatchery. Yogyakarta: Kanisius. 5. E. Rurangwaa, D.E.F. Kimeb, dan J.P.N. Olleviera. 2004. The Measurement Of Sperm Motility And Factors Affecting Sperm Quality In Cultured Fish," <i>Aquaculture</i> , Vol. 234 1 –28 6. Hadie, W., dan Hadie, L. E. 1993. <i>Giant Shrimp Hatchery</i> . Penerbit Kanisius. 7. Yogyakarta. 8. Haliman, RW dan D. Adijaya, S. 2005. <i>Vannamei Shrimp</i> . Penebar Swadaya. Jakarta 9. Murtijdo, B A. 2001. <i>Some Freshwater Fish Hatchery Methods</i> . Yogyakarta: Kanisius 10. Pujianti, P., Suminto., dan Rachmawati, D. 2014. Gonad Maturity Performance, Fecundity, and Hatching Rate of tiger prawns ( <i>Penaeus monodon</i> )

	<p>Fab.) Through Substitution of Sea Worms and Earthworms. Journal of Aquaculture Management and Technology 3 (4) : 158-165</p> <p>11. Syaifudin, H. 2013. Anatomy Physiology. Jakarta: EGC. Tang. U.M. dan R Affandi. 2001. Fisiologi Hewan Air. Unri</p>
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24	
Module designation (Code)	<b>Computer Application and Programming(18B01C307)</b>
Semester (s) in which the module is taught	3
Person responsible for the module	1. Dr. Jamaluddin P, MP 2. Khaidir Rahman, S.Pd., M.Pd 3. Muhammad Rizal, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture, lab work
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	
Content	<ol style="list-style-type: none"> <li>1. Introduction to Programming</li> <li>2. Types of Programming</li> <li>3. Proteus Applications</li> <li>4. Application of the Arduino IDE Application</li> <li>5. Arduino programming syntax</li> <li>6. Programming using LEDs</li> <li>7. Programming using Button</li> <li>8. Programming using LCD</li> <li>9. Programming using Buzzer</li> <li>10. Basics of computer programming</li> <li>11. Introduction to Excel macros</li> <li>12. Sub procedures on excel macros</li> <li>13. Procedure functions with arguments to macros</li> <li>14. Creating a user form</li> <li>15. Introduction to Matlab</li> <li>16. Arithmetic and variable operations (matlab)</li> <li>17. Arrays and matrices</li> <li>18. Functions and interactions with external files</li> <li>19. Data visualization</li> </ol>
Examination Forms	Formative test, summative test, product persentation, and project task.
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (10%), product persentation (20%), product (20%), midterm exam (20%) and final exam (30%).
Reading List	Abdia G. 2010. Matlab Programming. Informatika: Bandung.

25	
Module designation (Code)	<b>Agricultural Microbiology(18B01C308)</b>
Semester (s) in which the module is taught	3
Person responsible for the module	1. Dr. Andi Sukainah, STP., Msi 2. Indrayani, S.Pi., M.Biotech.Stu., Ph.D 3. Reski Praja Putra, S.TP., M.Si 4. Amiruddin Hambali, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture, Lab work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	College students are expected to master the competency standards: 1. Able to explain protist cells and difference between prokaryotic cells and eukaryotic cells 2. Able to explain microorganisms (bacteria, mold, and yeast) which are often found in agricultural and food products. 3. Able to explain and distinguish beneficial microbes, microbes as indicators of sanitation, spoilage and pathogen. 4. Able to explain the metabolic system (anabolism and catabolism) and genetics of microorganisms 5. Able to explain factors that play role in the growth of microorganisms
Content	1. <b>Preliminary</b> :definition and role of microbiology; microbiology as multidisciplinary science; history development of microbiology 2. <b>Prokaryotic and Eukaryotic Cells</b> :difference between prokaryotic and eukaryotic cells; arrangement of protist cells (prokaryotic and eukaryotic); typical structures in prokaryotic and eukaryotic cells 3. <b>Microscope</b> :lens and magnification; contrast microscope, dark field, ultraviolet, fluorescent, and electron microscope 4. <b>Bacteria</b> :bacterial morphology; bacterial growth on food 5. <b>Bacteria</b> :classification of bacteria 6. <b>Bacteria</b> :grouping bacteria based on the nature of their growth in food 7. <b>Yeast</b> :Morphology of yeast, reproductive system, physiological properties of yeast, and properties of some yeasts in food 8. <b>Mold</b> :general properties of molds; hyphae and mycelium, reproductive system, physiological properties of mold, and properties of some mold in food 9. <b>Energy Metabolism</b> :energy sources; respiration, fermentation, incomplete oxidation, photosynthesis, energy requirements for growth 10. <b>Macromolecular Biosynthesis</b> :macromolecular composition; polysaccharide, lipid, and protein biosynthesis 11. <b>Genetics of Microorganisms</b> :mutation, transfer

	<p>of DNA in bacteria; sexual reproduction in eukaryotic cells, phenotypic properties</p> <p>12. <b>Growth of Microorganisms</b> :definition of growth; microorganism growth curve</p> <p>13. <b>Growth of Microorganisms</b> :effect of food preservation on microorganisms; factors affecting the growth of microorganisms; mathematics of exponential growth</p> <p>14. <b>Ecology of Microorganisms in Food</b> :intrinsic factor, processing, extrinsic (environmental), and implicit factors; food classification</p>
Examination Forms	Oral presentation/essay/multiple choices/quizz/practical exam
Study and Examination Requirements	<p>Requirements for successfully passing the module;</p> <p>Minimum attendance of boths, lectures and practicum, is 80%; Students are required to pass practicum, with a minimum score of 85.</p> <p>The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)</p>
Reading List	<ol style="list-style-type: none"> <li>1. Sopandi, T. Wardah. 2014. Mikrobiologi Pangan (Teori dan Praktik). Yogyakarta : ANDI Yogyakarta</li> <li>2. Subandi, M. 2014. Mikrobiologi : Kajian dalam Perspektif Islam. Bandung : Remaja Rosdakarya</li> <li>Jay JM, MJ. Loessner, DA. Golden. 2005. Modern Food Microbiology Seventh Edition, Food Science Series. New York : Springer Science and Business Media</li> <li>3. Bagdi ML. 2009. Microbiology and Biochemistry. India : Manglam Publications</li> <li>4. Ray B. 2005. Fundamental Food Microbiology Third Edition. New York : CRC Press</li> <li>5. Adams MR., MO. Moss. 2008. Food Microbiology 3<sup>rd</sup> . RSC Publishing</li> <li>6. Hogg S., 2005. Essential Microbiology. John Wiley &amp; Sons Ltd</li> <li>7. Kim BH., GM. Gadd. 2008. Bacterial Physiology and Metabolism. Cambridge University Press</li> <li>8. Roberts D., M. Greenwood. 2003. Practical Food Microbiology 3<sup>rd</sup> . Blackwell Publishing</li> </ol>

26	
Module designation (Code)	<b>Entrepreneurship(18B01C309)</b>
Semester (s) in which the module is taught	3
Person responsible for the module	1. Prof. Dr. Ir. H. Husain Syam, M.TP., IPU 2. Dr. Ir. Nur Rahmah, M.Si 3. Dr. Andi Sitti Halima, SP., MP 4. Diyahwati, S.TP., M.Pd
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture, practical work
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	After taking this course, students are expected to have an understanding and inspiration about entrepreneurship and motivate them to be entrepreneur
Content	This course consists of theories on the basic concepts of entrepreneurship including: attitude, personality and profile of an entrepreneur, introduction of self-potential, development of managerial skills, courage to take risks, introduction to the function of entrepreneurial models, designing a business with BMC, developing ideas and analyzing business opportunities, SWOT analysis, creating a logo, knowing the sequences of business legality and knowing the code of entrepreneurship ethics and presenting and running a business as a Star Up Business
Examination forms	Oral presentation/essay/multiple choices/quizz/practical exam
Study and Examination Requirements	Requirements for successfully passing the module; Minimum attendance of boths, lectures and practicum, is 80%; The learning outcomes assessment consists of midterm exams (30%), final exams (40%), assignments (10%), Practicum (20%)
Reading List	1. Hikmah, 2010. <i>Modul Kewirausahaan untuk Program S-1</i> . Hikmah. Bandung 2. Kotler, Philip, 2005. <i>Manajemen Pemasaran Analisis Perencanaan, Implementasi dan Kontrol</i> , Jilid I dan II, Edisi Ke sebelas, Jakarta : PT Indeks. 3. _____ dan Gary Amstrong, 2001, <i>Prinsip-prinsip Pemasaran</i> , Jilid I, II, Jakarta : Penerbit Erlangga. 4. Ismari, dkk., <i>Modul Kewirausahaan</i> . 2015. Makassar: UNM Press. 5. Rahmah, Nurdan Diyahwati. 2020. <i>Kewirausahaan Pendidikan Teknologi Pertanian</i> . Makassar: ASKA Print. 6. Team Penyusun, 2016. <i>Buku Ajar Kewirausahaan</i> . Makassar: UNM Press

27	
Module designation (Code)	<b>Agroclimatology(18B01C310)</b>
Semester (s) in which the module is taught	3
Person responsible for the module	1. Prof. Dr. Patang, M.Si 2. Reski Febyanti Rauf, S.TP., M.Si 3. Dr. Andi Sitti Halima, SP., MP
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. The student will be able to understand the basic concepts and principles of agroclimatology</li> <li>2. The student will be able to explain the role and classification of climate, as well as analysis of changes to the growth of living things</li> <li>3. The student will be able to explain about the function of recording climate, zoning, and analysis of climate data</li> <li>4. The student will be able to explain the influence of climate on the agricultural ecosystem</li> </ol>
Content	<p>Some aspects discussed in this course are :</p> <ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Basic Concept and Principle of Agroclimatology</li> <li>3. Climate Elements</li> <li>4. Composition and role of the atmosphere</li> <li>5. Temperature and humidity distribution</li> <li>6. Role and climate classification</li> <li>7. Climate change analysis</li> <li>8. Climate logging</li> <li>9. Climate data analysis</li> <li>10. Climate modification and applications</li> <li>11. The influence of climate on agricultural ecosystems</li> <li>12. Climate compatibility with food crop and horticultural commodities</li> <li>13. Climate compatibility with fishery commodities</li> <li>14. Climate compatibility with livestock commodities</li> </ol>
Examination Forms	Formative test; Summative Tests; Journal Review; Project Tasks, Case Study
Study and Examination Requirements	<p>Requirements for successfully passing the module</p> <ol style="list-style-type: none"> <li>1. Minimum attendance at lectures is 80%.</li> <li>2. Final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%).</li> <li>3. Minimum final score is 61% ( "C" )</li> </ol>
Reading List	<ol style="list-style-type: none"> <li>1. Gordon B. Bonan, 2008. Ecological Climatology: Concept and Application. 2<sup>nd</sup> edition. Cambridge University.</li> <li>2. Bishnoi, OP.,2010. Applied Agroclimatology.</li> </ol>



	<p>Oxford.</p> <p>3. Ance Gunarsih, Kartasapoetra. 2012. <i>Klimatologi: Pengaruh Iklim terhadap Tanah dan Tanaman</i> Edisi Revisi. Bumi Aksara, Jakarta.</p>
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28	
Module designation (Code)	<b>Teacher Profession(18B01C401)</b>
Semester (s) in which the module is taught	4
Person responsible for the module	1. Dr. Muhammad Rais, MP., MT. 2. Ervi Novitasari, S.Pd., Gr., M.Pd. 3. Khaidir Rahman, S.Pd., Gr., M.Pd.
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Able to explain and discuss the definition of profession, requirements for the educational profession</li> <li>2. Able to explain and discuss the foundation of the educational profession and the competency standards of educators and educational staff</li> <li>3. Able to explain and discuss educational professional development strategies</li> <li>4. Able to explain teacher competence and professional development</li> <li>5. Able to detect and display the types of educational professions and be able to connect and sort out the duties and responsibilities of the educational profession according to their fields</li> <li>6. Able to explain the code of ethics for the teaching profession, educators, and education personnel</li> <li>7. Implement and support the use of educational technology in accordance with their respective fields</li> <li>8. Explain and discuss school management</li> <li>9. Able to explain and discuss the concept of educational supervision</li> <li>10. Explain and discuss the concept of teaching professional organizations and education personnel</li> <li>11. Explain and discuss the concept of guidance and counseling</li> <li>12. Describe, identify and discuss special services</li> <li>13. Explain and discuss non-formal education</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. The basic concept of the educational profession</li> <li>2. Professional development strategies &amp; professional challenges</li> <li>3. Types, duties and responsibilities of the profession</li> <li>4. Ethics of the educational profession</li> <li>5. Educational technology</li> <li>6. School management</li> <li>7. Educational supervision</li> <li>8. Teaching professional organizations and educational staff</li> <li>9. Guidance Counseling</li> <li>10. Special service and coes</li> <li>11. Non-formal education</li> </ol>
Examination Forms	Formative test, Summative Tests, structured task and independent task
Study and Examination Requirements	Requirements for successfully passing the module

	<p>minimum attendance at lectures is 80%, final score is evaluated based on assignments (20%), structured task (10%) independent task (10%), midterm exam (20%) and final exam (40%)</p>
<p>Reading List</p>	<ol style="list-style-type: none"> <li>1. Sulaeman Samad (editor). 2006. profesi keguruan, Makassar: Penerbit FIP UNM</li> <li>2. Arif Sadiman. 2016. Teknologi Pendidikan. Jakarta. Rajawali Pers</li> <li>3. Danim, Sudarwan, 2010. Profesionalisasi dan Etika Profesi Guru. Bandung: Alfabeta.</li> <li>4. IGwardani. 2018. Pengantar Ilmu Pendidikan Khusus. Jakarta: Rosdakarya</li> <li>5. Budianto. 2018. Pengantar Pendidikan Inklusi. Jakarta: Grafindo.</li> <li>6. Masyhud, Sulthon. 2014. Manajemen Profesi Kependidikan. Yogyakarta: Kurnia Kalam Semesta.</li> <li>7. Minarti, Sri. 2011. Manajemen Sekolah: Mengelola Lembaga Pendidikan Secara Mandiri. Jogjakarta. Ar-Ruzz-Media.</li> <li>8. Mudlofir, Ali 2014. Pendidik Profesional. Jakarta: Rajawali Pers.</li> <li>9. Mulyani, A.N., 1983, Administrasi pendidikan di sekolah, Yogyakarta : Andi Offset.</li> <li>10. Peraturan Pemerintah nomor 19 tahun 2005 tentang Standar Nasional Pendidikan</li> <li>11. Peraturan Pemerintah No 74 tahun 2008 tentang guru</li> <li>12. Prayitno &amp; C. Anti, 2015, Dasar-dasar Bimbingan &amp; Konseling, Jakarta: Rineka Cipta.</li> <li>13. Rusman. 2015. Teknologi Informasi dan Komunikasi. Jakarta. Rajawali Pers.</li> <li>14. Soelaeman Joesoep. 2004. Konsep Dasar Pendidikan Luar Sekolah. Jakarta: PT. Bumi Aksara</li> <li>15. Soetjipto &amp; Kosasi, Raflis. 2011. Profesi Keguruan. Jakarta: Rineka Cipta.</li> <li>16. Sudjana, H.D. 2010. Pendidikan Nonformal: Wawasan, Sejarah, Perkembangan, Filsafat, Teori Pendukung, Asas. Bandung: Falah Production</li> <li>17. Suparno. 2017. Dasar-dasar Pendidikan Berkebutuhan Khusus. Jakarta: Dikti 2017</li> <li>18. Susanto, Ahmad, 2018, Bimbingan &amp;Konseling di Sekolah: Konsep, Teori &amp; Aplikasinya. Jakarta: Gramedia.</li> <li>19. Undang-Undang nomor 20 Tahun 2003 tentang Sistem Pendidikan Nasional</li> </ol>

29	
Module designation (Code)	<b>Learning Planning(18B01C402)</b>
Semester (s) in which the module is taught	4
Person responsible for the module	1. Dr. Muhammad Rais, MP., MT. 2. Ervi Novitasari, S.Pd., Gr., M.Pd. 3. Khaidir Rahman, S.Pd., Gr., M.Pd.
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	In learning activities, students are expected to be able to: 1. Able to explain the basic concepts of lesson planning and the competence of lesson planning preparation 2. Able to explain learning objectives 3. Able to analyze operational verbs 4. Able to choose models, approaches, strategies and learning techniques 5. Able to explain learning resources 6. Able to explain learning media 7. Able to compile the development of teaching materials 8. Able to make student worksheets 9. Able to explain learning assessment 10. Able to explain learning outcome assessment 11. Creating a learning implementation plan (RPP)
Content	Study materials / learning planning materials, namely: 1. The basic concept of learning planning 2. Learning objectives 3. Operational verb (KKO) 4. Strategic approaches, methods, models, and learning techniques 5. Learning resources 6. Learning media 7. Development of teaching materials 8. Compilation of student worksheets 9. Learning assessment 10. Development of results evaluation tools 11. Making a learning implementation plan (RPP)
Examination Forms	Formative test, Summative Tests, structured task and independent task
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (20%), structured task (10%) independent task (10%), midterm exam (20%) and final exam (40%)
Reading List	1. Ananda Rusydi. 2019. Perencanaan Pembelajaran. Medan: LPPI 2. Arsyad Azhar.2015. Media pembelajaran. PT Raja Grafindo Persada: Jakarta 3. Jaya Farida, 2019. Perencanaan pembelajaran. Fakultas ilmu terbiyah dan keguruan: Uin Sumatra

	Utara
	4. Mansyur, rasyid, H.,2015 Suratno. Assesmen Pembelajaran Sekolah.Pustaka Pelajar: Yogyakarta
	5. Sujarwo., Ummaya, S, F., Trisanti. 2018. Pengelolaan Sumber Belajar Masyarakat.Yogyakarta
	6. Muhidin, A & Al, F, U.2018. Pengembahan Bahan Ajar. Unpan Press Tangerang
	7. Ratnawulan, E & Rusdiana. 2014. Evaluasi pembelajaran: Pustaka Setai bandung: Bandung

30	
Module designation (Code)	<b>Learning Media(18B01C403)</b>
Semester (s) in which the module is taught	4
Person responsible for the module	1. Dr. Muhammad Rais, MP., MT. 2. Khaidir Rahman, S.Pd., Gr., M.Pd. 3. Ervi Novitasari, S.Pd., Gr., M.Pd.
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Students are able to explain the meaning of learning media and the scope of learning media studies</li> <li>2. Students are able to describe the nature of learning media</li> <li>3. Students are able to describe the foundations and principles of using learning media</li> <li>4. Students are able to classify the types of learning media</li> <li>5. Students are able to develop silent visual media products</li> <li>6. Students are able to evaluate silent visual media products</li> <li>7. Students are able to develop visual motion media products</li> <li>8. Students are able to evaluate visual motion media products</li> <li>9. Students are able to develop pure audio visual media products</li> <li>10. Students are able to evaluate pure audio visual media products</li> <li>11. Students are able to develop impure audio visual media products</li> <li>12. Students are able to evaluate pure audio visual media products</li> <li>13. Students are able to describe the use and development of interactive learning media</li> </ol>
Content	<p>The material taught in this course in general is:</p> <ol style="list-style-type: none"> <li>1. Understanding learning media and the scope of learning media studies</li> <li>2. The essence of learning media</li> <li>3. The foundation and principles of using instructional media</li> <li>4. Types of learning media</li> <li>5. Development and evaluation of silent visual media products</li> <li>6. Development and evaluation of visual motion media products</li> <li>7. Development and evaluation of pure audio visual media products</li> <li>8. Development and evaluation of impure audio-visual media products</li> <li>9. Development of interactive learning media</li> </ol>
Examination Forms	Formative test, summative test, product presentation, and project task.

Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (10%), product persentation (10%), product (20%), midterm exam (20%) and final exam (40%).
Reading List	<ol style="list-style-type: none"> <li>1. Arsyad, Azhar. 2015. Media Pembelajaran. Jakarta: Rajawali Pers.</li> <li>2. Sukiman. 2012. Pengembangan Media Pembelajaran. Yogyakarta : Pedagogia</li> <li>3. Fatimatur, R. E. 2018. Media Pembelajaran. Surabaya : IAIN sunan ampel Surabaya</li> <li>4. Ramli, Muhammad. 2012. Media dan Teknologi Pembelajaran. Banjarmasin : IAIN Antasari Press</li> <li>5. Dwi, S. H. 2017. Multimedia Pembelajaran Interaktif. Yogyakarta : UNY Press.</li> </ol>

31	
Module designation (Code)	<b>Agricultural Industrial System(18B01C404)</b>
Semester (s) in which the module is taught	4
Person responsible for the module	1. Prof. Dr. Lahming, MS 2. Dr. Ir. Nur Rahmah, M.Si 3. Dr. Andi Sitti Halima, SP., MP
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Students are able to understand the concept of the Agricultural Industrial System</li> <li>2. Students are able to understand marketing techniques</li> <li>3. Students are able to understand market needs analysis</li> <li>4. Students are able to understand market forecasting,</li> <li>5. Students are able to understand the availability &amp; needs of industrial raw materials.</li> <li>6. Students are able to design/design process technology development.</li> </ol>
Content	<p>Efficient Agricultural Industry Planning and integration of key components; marketing, supply of raw materials, and process technology; Marketing component; 4 marketing elements (marketing mix; product, promotion, price, place); Consumer analysis (definition and consumer behavior); Marketing planning (factors, objectives, market segmentation, marketing strategy); Forecasting (forecasting) product demand (objectives, functions and benefits); Factors affecting product forecasting. Components of Raw Material Supply ( Raw material requirements. Production trends. Control, Quantity and quality of raw materials. Procurement time series, scheduling, and transportation models, • Raw material production projections. Sensitivity analysis, Material procurement model Raw Materials Process Technology Components (Required production capacity, Technology for processing processes, Selection of processing machinery and equipment. Factory location, Equipment layout, inventory management, Resource scheduling, Production optimization, Product utilization, Waste handling; HR Management; Industry Regulations Agriculture</p>
Examination Forms	Oral presentation/essay/multiple choices/ quizz/practical exam
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (10%), midterm exam (30%) and final exam (40%), participation/activeness (10%)



Reading List	Soetriono, Anik Suwandari, 2016. Pengantar Ilmu Pertanian : Agraris-Agribisnis-Industri. Intimedia Malang
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32	
Module designation (Code)	<b>Food Safety(18B01C405)</b>
Semester (s) in which the module is taught	4
Person responsible for the module	1. Dr. Ir. Nur Rahmah, M.Si 2. Ratnawaty Fadilah, S.TP., M.Sc 3. Reski Praja Putra, S.TP., M.Si 4. Amiruddin Hambali, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture, Lab work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	College students are expected to master the competency standards: 1. Able to explain toxicology in environment which includes hazardous metals and pesticide toxicology 2. Able to explain anti-nutritional substances, antibiotic residues, and toxicology of food additives 3. Able to explain food toxicology, which includes pathogenic microorganisms in food 4. Able to explain toxic chemical compounds in plants 5. Able to explain viruses in food, parasites, and protozoa in food
Content	1. <b>Introduction of Food Safety</b> : definition and scope of food safety 2. <b>Factors Contributing to Toxicity in Environment</b> : biotic and abiotic factors 3. <b>Toxicology of Heavy Metals</b> : mainofheavy metal and other metals 4. <b>Pesticide Toxicology</b> :types of pesticides (insecticide, fungicide, herbicide, and rodenticides); work safety 5. <b>Food Additives are Prohibited, Dangerous, and Must be Considered</b> :food additives forbidden and dangerous, dyes are problematic and dangerous; preservatives and sweeteners that are safe, but must be considered 6. <b>Antibiotic Residue</b> : definition of antibiotics; types and mechanisms of action of antibiotics 7. <b>Antibiotic Residue</b> : use of antibiotics in animal husbandry; antibiotic residue in food; The dangers of antibiotic residues 8. <b>Pathogenic Microorganisms in Food</b> : bacteria that cause infectious diseases, non-intestinal pathogenic bacteria, bacteria that cause food poisoning are infectious types 9. <b>Pathogenic Microorganisms in Food</b> : bacteria that cause food poisoning are toxic-co-infection types; bacteria that cause poisoning intoxication; pathogenic fungi 10. <b>Toxic Chemical Compounds in Food</b> : natural toxic compounds in food; toxic compounds in mushrooms (fungi)

	<p>11. <b>Toxic Chemical Compounds in Food</b> : natural plant compounds that are addictive and sedative</p> <p>12. <b>Anti-nutritional Substance</b> : antiprotein compounds, anti-vitamin, and anti-mineral compounds</p> <p>13. <b>Viruses, Parasites, and Protozoa in Food</b> : foodborne viruses and parasites</p> <p>14. <b>Viruses, Parasites, and Protozoa in Food</b> : protozoa in food</p>
Examination Forms	Oral presentation/essay/multiple choices/quizz/practical exam
Study and Examination Requirements	<p>Requirements for successfully passing the module;</p> <p>Minimum attendance of boths, lectures and practicum, is 80%; Students are required to pass practicum, with a minimum score of 85.</p> <p>The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)</p>
Reading List	<ol style="list-style-type: none"> <li>1. Winarno FG. 2004. Keamanan Pangan, Jilid 1. Bogor : M-Brio Press</li> <li>2. Winarno FG. 2004. Keamanan Pangan, Jilid 2. Bogor : M-Brio Press</li> <li>3. Winarno FG. 2004. Keamanan Pangan, Jilid 3. Bogor : M-Brio Press</li> <li>4. Sembel DT. 2015. Toksikologi Lingkungan. Yogyakarta : ANDI Yogyakarta</li> <li>5. Helferich W, CK. Winter. 2001. Food Toxicology. CRC Press.</li> <li>6. Omaye ST. 2004. Food and Nutritional Toxicology. CRC Press</li> <li>7. McElhatton A., RJ. Marshall. 2007. Food Safety A Practical and Case Study Approach. Springer</li> <li>8. Roberts CA., 2001. The Food Safety Information Handbook. Oryx Press.</li> <li>9. Abbas HK. 2005. Aflatoxin and Food Safety. CRC Taylor &amp; Francis Group</li> <li>10. D'Mello JPF. 2003. Food Safety : Contaminant and Toxin. CABI Publishing</li> <li>11. Heredia N., I. Wesley, S. Garcia. 2009. Microbiologically Safe Foods. John Wiley &amp; Sons, Inc</li> </ol>

33	
Module designation (Code)	<b>Post-Harvest Fisiology(18B01C406)</b>
Semester (s) in which the module is taught	4
Person responsible for the module	1. Dr. Andi Sukainah, S.TP., M.Si 2. Ratnawaty Fadilah, S.TP., M.Sc 3. Reski Praja Putra, S.TP., M.Si 4. Amiruddin Hambali, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture, lab work
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	1. Able to explain the role of post-harvest physiology in the development of post-harvest technology that is suitable for post-harvest products. 2. Able to explain the control of storage time for post-harvest agricultural products (horticulture) with prime quality starting from harvesting until they are ready for consumption by consumers. 3. Ideal development of optimal color, aroma, flavor, hardness, and sugar content as key parameters to produce quality off-harvest agricultural products
Content	This course discusses the important role of post-harvest physiology in the application of post-harvest technology for agricultural products. Metabolic processes (respiration and ethylene biosynthesis) and the characteristics of post-harvest products. Post-harvest physiological, physical, and chemical changes (changes in the respiration process, ethylene, hardness, color, aroma, and flavor) as a result of post-harvest chemical handling, atmospheric engineering during storage and application of post-harvest technology for other agricultural products
Examination Forms	Oral presentation/essay/multiple choices/ quizz/practical exam
Study and Examination Requirements	Requirements for successfully passing the module;  Minimum attendance of boths, lectures and practicum, is 80% ; Students are required to pass practicum, with a minimum score of 85.  The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)
Reading List	1. Gardjito M, YR. Swasti. 2014. Fisiologi Pascapanen Buah dan Sayur. Yogyakarta : Gadjah Mada University Press 2. Winarno., F.G. 2002. Fisiologi Lepas Panen Produk Hortikultura. Bogor. M-Brio Press. 3. Kartasaputra AG. 1994. Teknologi Penanganan Pasca Panen. Jakarta : Rineka Cipta 4. Burg SP. 2004. Postharvest Physiology and Hypobaric Storage of Fresh Produced. CABI

	<p>Publishing</p> <ol style="list-style-type: none"><li>5. Beier RC, SD. Pillai, TD. Phillips, RL. Ziprin. 2004. Preharvest and Postharvest Food Safety Contemporary Issues and Future Directions. Blackwell Publishing and The Institute of Food Technologists</li><li>6. Jongen W. 2002. Fruit and Vegetable Processing Improving Quality. CRC Press</li><li>7. Seymour. G, Taylor. J, and Tucker. G. 1993. Biochemistry of Fruit Ripening. Cambridge. Chapman and Hall.</li></ol>
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34	
Module designation	<b>Sanitation and Agricultural Waste Handling(18B01C407)</b>
Semester (s) in which the module is taught	4
Person responsible for the module	<ol style="list-style-type: none"> <li>1. Dr. SubariYanto, M.Si</li> <li>2. Dr. Mohammad Widjaya M, M\S.Si., M.Si</li> <li>3. RatnawatyFadilah, S.TP., M.Sc</li> <li>4. Diyahwati, S.TP., M.Pd</li> </ol>
Language	Bahasa Indonesia
Relation to curriculum	Compulsory
Teaching methods	Lecture, practical work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit ponits	2
Required and recommended prerequisites for joining the module	-
Module onjectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Students master the knowledge of the definition and scope of management and management of food industry waste</li> <li>2. Students can apply actions and apply in everyday life.</li> <li>3. Inequality of food industry waste, can measure the level of waste pollution and treat food industry waste.</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. Introduction of Food Industry Sanitation</li> <li>2. Food Microorganisms</li> <li>3. Growth of Microorganisms and Food Toxication</li> <li>4. Personal Hygiene</li> <li>5. Hygiene equipment</li> <li>6. Food handling</li> <li>7. Cross Contamination and Equipment Layout</li> <li>8. Food Industry Waste, Characteristics of Food Industry Waste</li> <li>9. Food Industry waste treatment</li> <li>10. Measurement of Wastewater Pollution Levels</li> <li>11. Characteristics of Industrial Waste of Fruits and Vegetables, Beef and Poultry, and Milk and Seafood</li> </ol>
Examination Forms	Formative test; Summative Tests; Journal Review; Project Tasks, Case Study.
Study and Examination Requirements	Minimum attendance at lectures is 80%. Final score is evaluated based on assignments (30%), midterm exam (30%) and final exam (40%).
Reading List	<ol style="list-style-type: none"> <li>1. K.A., Buckle..Et Al. 1987. Food Science. Second Edition. University of Indonesia. Jakarta.</li> <li>2. Nusa Idaman Said. (2011). Domestic Waste Management. Jakarta: BPPT.</li> <li>3. Rusdin R. 2013. Food Sanitation and HACCP. First Edition. Graham Science. Yogyakarta.</li> <li>4. Sofian. (2011). Success in Making Compost from Trash. South Jakarta: Agromedia Pustaka.</li> <li>5. Suharto.Ign. (2011). Chemical Waste in Air and Air Pollution. Yogyakarta: CV. Andi Offset.</li> <li>6. Yulipriyanto. (2010). Soil Biology and Management Strategies. Yogyakarta: Graha Science.</li> </ol>

35	
Module designation (Code)	<b>Fluid Mechanics(18B01C408)</b>
Semester (s) in which the module is taught	4
Person responsible for the module	1. Andi Muhammad Akram Mukhlis, ST., M.Si 2. Nunik Lestari, S.T.P., M.Si 3. Reski Febyanti Rauf, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	Applied Physics, Engineering Mechanics
Module objectives/intended learning outcomes	1. The student will be able to understand the basic concepts of fluid mechanics 2. The student will be able to describe the concepts and basic laws of fluid flow in pipes and open channels 3. The student will be able to apply equations in fluid mechanics to solve basic problems in agriculture
Content	Some aspects discussed in this course are : 1. Introduction 2. Basic Properties and Characteristics of Fluid 3. Fluid Statics 4. Fluid Kinematics 5. Fluid Flow 6. Basic Fluid Flow Equations I 7. Basic Fluid Flow Equations II 8. Boundary Layer 9. Pipe Flow 10. Open Channel Flow 11. Basic Concepts of Open Channel Flow 12. Basic Open Channel Flow Equations I 13. Basic Open Channel Flow Equations II 14. Dams and Irrigation
Examination Forms	Formative test; Summative Tests; Journal Review; Project Tasks, Case Study.
Study and Examination Requirements	Requirements for successfully passing the module: 1. Minimum attendance at lectures is 80%. 2. Final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%). 3. Minimum final score is 61% ( "C" )
Reading List	1. Munson, Bruce R.,Young, Donald F., Okiishi, Theodore H., Huebsch Wade W. 2009. Fundamentals of Fluid Mechanics, Sixth Edition. John Wiley and Sons, Inc. USA. 2. Smits, Alexander J. 2017. A Physical Introduction to Fluid Mechanics, Second Edition. A.J. Smits Princeton University. 3. Kreith, F., Berger, SA., et.al. 1999. Fluid Mechanics, Mechanical Engineering Handbook.

	<p>CRC Press.</p> <ol style="list-style-type: none"><li>4. Pritchard, Philip J., Leylegian, John C. 2011. Fox and McDonald's, Introduction to Fluid Mechanics, Eighth Edition. John Wiley and Sons, Inc. USA.</li><li>5. White, Frank M. Fluid Mechanics, Fourth Edition. McGraw-Hill.</li><li>6. Ridwan. 2007. Mekanika Fluida Dasar. Penerbit Gunadarma.</li><li>7. Chow, Ven Te. 1988. Open-Channel Hydraulics. McGraw-Hill Classic Textbook Reissue. McGraw-Hill Book Company: USA.</li><li>8. GSHydro. 2014. Hydraulic Piping Standard Handbook, Revision 1. GS-Hydro Corporation: Finland.</li></ol>
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36	
Module designation (Code)	<b>Management of Coastal and Marine Areas(18B01C409)</b>
Semester (s) in which the module is taught	4
Person responsible for the module	Prof. Dr. Patang, S.Pi., M.Si. Dr. Subari Yanto, M.Si. Andi Alamsyah Rivai, S.Pi., M.Si. Amirah Mustarin, S.Pi.M.Si.
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Students can explain the meaning, potential, and characteristics of coastal and marine areas.</li> <li>2. Students can understand important ecosystems in coastal and marine areas.</li> <li>3. Students can classify the coastal abiotic environment.</li> <li>4. Students can evaluate the socio-economic of coastal communities.</li> <li>5. Students can plan the management of fishery resources.</li> <li>6. Students can analyze integrated coastal and marine management.</li> </ol>
Content	<p>Some aspects discussed in this course are :</p> <ol style="list-style-type: none"> <li>1. Definition and Potential of Coastal Areas.</li> <li>2. General Understanding of Integrated Coastal Management.</li> <li>3. Mangroves.</li> <li>4. Seagrass meadows.</li> <li>5. Coral Reefs.</li> <li>6. Geomorphology and Tides.</li> <li>7. Temperature and Salinity.</li> <li>8. Definition and Factors in Socio-Economic</li> <li>9. Scientific Methods in Monitoring Socio-Economic Conditions.</li> <li>10. Fishery Resources.</li> <li>11. Marine Protected Areas.</li> <li>12. Coastal Area Problems.</li> <li>13. Definition and Dimensions of Integrated Coastal Resources Management.</li> <li>14. Small Island Carrying Capacity.</li> <li>15. Coastal Management Planning and Strategy</li> </ol>
Examination Forms	Formative test, Summative Test, Structured Task, Exercise, Journal Review; Project Tasks, and Case Study
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (15%), Quiz (20%) structured task (15%), midterm exam (25%) and final exam (25%)
Reading List	<ol style="list-style-type: none"> <li>1. Johanes, 2008. Pengelolaan sumber daya perikanan laut, Gajah Mada university Press, Yogyakarta.</li> <li>2. Press, A., &amp; Bulletin, W. S. (2015). <i>Environmental</i></li> </ol>

	<p><i>Management and Governance: Advances in Coastal and Marine Resources</i> (Vol. 8). Switzerland 2015: Springer.</p> <ol style="list-style-type: none"><li>3. Bartlett, D., &amp; Celliers, L. (2017). <i>Geoinformatics for Marine and Coastal Management</i>. Boca Raton: CRC Press: Taylor &amp; Francis Group.</li><li>4. Moksness, E., Dahl, E., &amp; Støttrup, J. (2013). <i>Global challenges in integrated coastal zone management</i>. West Sussex: Wiley-Blackwell.</li><li>5. Ramanathan, A., Bhattacharya, P., Dittmar, T., Prasad, M. B. K., &amp; Neupane, B. R. (2010). <i>Management and Sustainable Development of Coastal Zone Environments</i>. Springer Netherlands.</li><li>6. Ruddle, K., &amp; Satria, A. (2010). <i>Managing Coastal and Inland Waters: Pre-existing Aquatic Management Systems in Southeast Asia</i>. New York: Springer US.</li><li>7. MacDonald, B. H., Soomai, S. S., Santo, E. M. De, &amp; Wells, P. G. (2016). <i>Science, Information, and Policy Interface for Effective Coastal and Ocean Management</i>. Boca Raton: CRC Press: Taylor &amp; Francis Group.</li></ol>
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37	
Module designation (Code)	<b>Aquaculture Technology(18B01C410)</b>
Semester (s) in which the module is taught	4
Person responsible for the module	1. Prof. Dr. Patang, S.Pi., M.Si 2. Dr. ErnawatiSyahrudinKaseng, M.Si 3. Amirah Mustarin, S.Pi., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture, lab work
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	Students are able to: 1. Understand the scope of aquaculture. 2. Identify the types of aquatic biota that can become an economic commodity for aquaculture. 3. Understand the characteristics of aquaculture economic commodities 4. Conduct important and economical freshwater, brackish and marine fish farming 5. understand extensive, semi-intensive and intensive cultivation systems 6. apply an intensive system to aquaculture activities.
Content	1. The scope of aquaculture. 2. Types of economically important aquatic organisms for aquaculture. 3. Characteristics of aquaculture economic commodities 4. Cultivation of economically important freshwater, brackish and marine fish 5. Extensive, semi-intensive and intensive cultivation systems 6. Intensive system to aquaculture activities.
Examination Forms	Oral presentation/essay/quizz/ Practical exam
Study and Examination Requirements	Requirements for successfully passing the module: 1. Minimum attendance at lectures is 80%. 2. Final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%). 3. Minimum final score is 61% ( "C" )
Reading List	1. Amri, K. 2003. Intensive tiger prawn cultivation. Agromedia Pustaka. Jakarta 2. Amri, K dan I. Kanna. 2008. Intensive Vanname Shrimp Cultivation. 3. Amri, K dan Khairuman. 2013. Fish cultivation. Agromedia. Jakarta 4. Aslan, L.M., 1998. Seaweed Cultivation. Penerbit Kanisius. Yogyakarta. 5. Ciptanto, S. (2002). Top 10 Freshwater Fish. Andi publisher. Yogyakarta 6. Effendi, H. (2003). Water quality study: For the management of aquatic resources and environment. Kanisius. Yogyakarta 7. IKAPI. 2003. Reviewing the Quality of Water Resources and Aquatic Environment. Kanisius: Yogyakarta

	8. Sopian, A., Khasani, I., dan Anggraeni, F. 2013. Utilization of Biofloc from Nursery Media for cultivation of giant prawns Larvae ( <i>Macrobrachium rosenbergii</i> ). <i>Widyariset</i> 16 (2) : 277-232.
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38	
Module designation (Code)	<b>Learning Strategy(18B01C501)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Dr. Muhammad Rais, S.Pd., MP., MT 2. Khaidir Rahman, S.Pd., M.Pd 3. Ervi Novitasari, S.Pd., M.Pd
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<p>Students can:</p> <ol style="list-style-type: none"> <li>1. Explain the concept of approaches, strategies, methods, and models in learning along with real examples in learning practices in schools</li> <li>2. Explaining 21st century learning concepts in the era of the industrial revolution 4.0</li> <li>3. Classifying the Taxonomy of Learning Variables based on Cognitive, Affective, and Psychomotor domains</li> <li>4. Explain the concept of Contextual Teaching and Learning and its practice in the context of classroom learning</li> <li>5. Explain the concept of active learning at the unit level of secondary primary education (Active Learning in School) and higher education (Active Learning in Higher Education)</li> <li>6. Applying various types of cooperative learning models and their applications in learning</li> <li>7. Explain the principles of the Inquiry Based Learning model and their application in learning</li> <li>8. Explain the principles of the Discovery Based Learning model and their application in learning</li> <li>9. Explain the principles of the Problem Based Learning (PBL) model and their application in learning</li> <li>10. Explain the principles of the Project Based Learning (PjBL) model and their application in learning</li> <li>11. Explain the principles of the Teaching Factory (TeFa) model and their application in learning</li> <li>12. Explain the principles of the Work Based Learning model and their application in learning</li> <li>13. Explain the STEAM learning model and its application in learning</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. Approaches, Strategies, Methods, and Models in Learning</li> <li>2. 21st century learning in the era of the industrial revolution 4.0</li> <li>3. Taxonomy of Learning Variables (Cognitive,</li> </ol>

	<p>Affective, and Psychomotor)</p> <ol style="list-style-type: none"> <li>4. Contextual Teaching and Learning Approach</li> <li>5. Active Learning in School and Active Learning in Higher Education</li> <li>6. Cooperative learning model (cooperative learning)</li> <li>7. Inquiry Based Learning Model</li> <li>8. Model Discovery Learning</li> <li>9. Model Problem Based Learning (PBL)</li> <li>10. Model Project Based Learning (PjBL)</li> <li>11. Model Teaching Factory (TeFa)</li> <li>12. Work Based Learning Model</li> <li>13. STEAM learning model</li> </ol>
Examination Forms	Formative test; Summative tests; Journal Review; Film Review; Project Tasks
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments 40%), active discussion (10%), midterm exam (20%) and final exam (30%)
Reading List	<ol style="list-style-type: none"> <li>1. Maslam Bukit (2014). Strategi dan Inovasi Pendidikan Kejuruan. Bandung: Alfabeta.</li> <li>2. Putu Sudira (2020). Paradigma Baru Pembelajaran Vokasional Era Revolusi Industri 4.0. UNY. Press</li> <li>3. Putu Sudira (2018). Metodologi Pembelajaran Vokasional Abad XXI. UNY. Press</li> <li>4. Slavin, Robert E (2008). Cooperative Learning Teori, Riset, dan Praktik. Bandung: Nusa Media.</li> <li>5. Tritiyatma, dkk. (2017). Keterampilan Abad 21 Dan STEAM (Science, Technology, Engineering, Art And Mathematics) Project Dalam Pembelajaran Kimia</li> <li>6. Arends, R. I. 2007. <i>Learning to Teach</i> (Edisi Ketujuh). New York: McGraw Hill Companies.</li> <li>7. Smith, P.L., &amp; Ragan, T.L., 2007, <i>Instructional Design</i>, Third Edition, John Wiley &amp; Sons, Inc.</li> <li>8. Daniel, M.. &amp; David, R. 2008. <i>Efective Teaching</i>. Yogyakarta: Pustaka Pelajar.</li> </ol>

39	
Module designation (Code)	<b>Learning Evaluation(18B01C502)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Prof. Dr. Ir. H. Husain Syam, M.TP., IPU. 2. Dr. Muhammad Rais, MP., MT. 3. Ervi Novitasari, S.Pd., Gr., M.Pd. 4. Diyahwati, S.TP., M.Pd
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	Students can : 1. Explain the concept of measurement, assessment, and evaluation of learning outcomes 2. Describe the purpose and function of evaluating learning outcomes 3. Explain the principles and guidelines for assessment 4. Describe the aspects of learning outcomes that must be measured 5. Describe the form of test and non-test assessment instruments 6. Planning and developing tests and non-tests 7. Constructs LOT and HOT test instruments 8. Scoring test results 9. Make an analysis of the level of difficulty and differentiation 10. Make a validity and reliability test analysis 11. Understand and establish administrative procedures and reporting of measurement and assessment results
Content	1. Measurement, assessment, and evaluation of learning outcomes 2. The purpose and function of evaluating learning outcomes 3. Assessment principles and references 4. The aspects of learning outcomes that must be measured 5. The form of test and non-test assessment instruments 6. Test and non-test planning and development 7. The skill of making LOT and HOT test instruments 8. Scoring of test results (Objective test scores, essay test scores, converting raw scores to standard scores) 9. Analyze the level of difficulty and difference power 10. Validity test analysis 11. Reliability test analysis

	12. Administrative procedures and reporting of measurement and assessment results
Examination Forms	Formative test, Summative Tests, structured task and quiz
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (15%), Quiz (20%) structured task (15%), midterm exam (25%) and final exam (25%)
Reading List	<ol style="list-style-type: none"> <li>1. Direktorat Pembinaan Sekolah Menengah Kejuruan. 2005. Penilaian, Pengadministrasian dan Pelaporan Hasil Belajar Peserta Didik Sekolah Menengah Kejuruan. Jakarta: Depdiknas.</li> <li>2. Ebel, R. L. &amp; Frisbie, D. A. 1986. Essentials of Educational Measurement. Englewood Cliffs. N. J.:Prentice-Hall.</li> <li>3. Harun Rasyid.2009. Penilaian Hasil Belajar. Bandung: CV. Wacana Prima</li> <li>4. Ngalim Purwanto. 2010. Prinsip-Prinsip dan Teknik Evaluasi Pengajaran. Bandung: PT Remaja Rosdakarya.</li> <li>5. Purwanto. 2009. Evaluasi Hasil Belajar. Yogyakarta: Pustaka Pelajar.</li> <li>6. Suharsimi Arikunto. 1992. Dasar-dasar Evaluasi Pendidikan. Jakarta: PT Bumi Aksara.</li> <li>7. Wildansyah. 2014. Evaluasi Hasil Belajar. Medan: FIP Unimed</li> </ol>



40	
Module designation (Code)	<b>Research Methodology and Scientific Writing(18B01C503)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Prof. Dr. Lahming, MS 2. Dr. Muhammad Rais, S.Pd., MP., MT
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture, practical work
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	Students can: 1. Describe the nature of research (philosophy, functions, assumptions, and research objectives) 2. Explain deductive, inductive, scientific and non-scientific thinking methods 3. Describe the various types of research 4. Explain the concept of background, problem formulation, research objectives 5. Explain literature review, direct and indirect citation techniques, and research frameworks 6. Explain the concept of research variables, operational definitions of variables, research design, instruments, and research analysis 7. Explain the results and discussion, conclusions, suggestions, and bibliography in research 8. Designing initial research ideas that have the opportunity to be developed into research proposals in the field of education and agricultural technology
Content	1. Essence of research 2. Know the various methods and models of thinking in search of the truth, 3. Types of research in education, 4. The concept of developing a background and problem formulation in educational research, 5. The concept of literature review and educational research hypotheses 6. Designing research methods according to the type of research used, 7. Techniques for making research proposals complete with research reports in education 8. Techniques for formulating results and discussion in research
Examination Forms	Formative test; Summative tests; Project Tasks to make a research proposal
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments 40%), active discussion (10%), midterm exam (20%) and final

	exam (30%)
Reading List	<ol style="list-style-type: none"> <li>1. Tuckman. W. Bruce. (1978). <i>Conducting Educational Research</i>. Second Edition, New York: Hartcourt- Brace Jovanovich Inc</li> <li>2. Sugiyono, (2008). <i>Metode Penelitian Kuantitatif Kualitatif dan R&amp;D</i>. Bandung. Alfabeta</li> <li>3. Arikunto, Suharsimi. 2016. <i>Prosedur Penelitian: Suatu Pendekatan Praktik</i>. Jakarta: Rineka Cipta</li> <li>4. Sumadi Suryabrata, B.A., M.A.,Ed.S., Ph.D. (2013). <i>Metodologi Penelitian</i>, 2nd ed, Jakarta :PT Raya Grafindo Persada</li> <li>5. Kerlinger, F. N., &amp; Lee, H. B. (2000). <i>Foundations of Behavioral Research</i>. Orlando: Harcourt College Publishers</li> </ol>

41	
Module designation (Code)	<b>Statistics(18B01C504)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Dr. Jamaluddin P, MP 2. Prof. Dr. Patang, S.Pi., M.Si 3. Andi AlamsyahRivai S.TP., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit ponits	2
Required and recommended prerequisites for joining the module	Engineering Maths
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Students are able to explain general statistical concepts and identify data scales from variables</li> <li>2. Students are able to practice presenting data in a textual, tabular, and graphical way</li> <li>3. Students are able to select, calculate and process research data.</li> <li>4. Students are able to understand procedures in research, processing and statistical data processing</li> <li>5. Students are able to understand the procedure in testing a statistical data</li> <li>6. Students are able to analyze the results of testing a statistical data</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. Statistical Data</li> <li>2. Frequency Distribution</li> <li>3. Center Value Measure</li> <li>4. Linear and multivariable regression</li> <li>5. Correlation and covariance</li> <li>6. Probability</li> <li>7. Normal Distribution</li> <li>8. T-student and chi-square . distribution</li> <li>9. Confidence interval</li> <li>10. Estimated mean and variance</li> <li>11. Statistical test of mean and variance</li> </ol>
Examination Forms	Formative test, Summative Test, Structured Task, Exercise, quizz
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (15%), Quiz (20%) structured task (15%), midterm exam (25%) and final exam (25%)
Reading List	<ol style="list-style-type: none"> <li>1. Ken Black, (2013), Business Statistics, John Willey &amp; Sons</li> <li>2. Wijaya, Tony. (2010), Analisis Multivariat, Penerbit Cahaya Atma</li> <li>3. Hair, J.F., Black, B., Babin, B., Anderson, R, E &amp; Tatham, R. L., (2006). Multivariate data analysis, 6th Edition, New Jersey : Prentice Hall International, Inc</li> </ol>

42	
Module designation (Code)	<b>Fishing Technology(18B01C505)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Prof. Dr. Patang, S.Pi., M.Si. 2. Andi Alamsyah Rivai, S.Pi., M.Si. 3. Marhayarti, S.Pi.M.Pd.
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture, lab and field works
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Explain the classification of fishing methods, fishing units, and terms that are often used in the field of fishing</li> <li>2. Explain, describe the principles of fishing methods in trap fishing gear</li> <li>3. Explain and describe the principles of fishing methods in ring trawl, gill net, trawling, and line fishing gear</li> <li>4. Explain and describe the principles of fishing methods on lift net fishing gear, and be able to compare the operating methods between one lift net and another lift net.</li> <li>5. Explain the various uses of fishing aids (lights, FADs, acoustics, and other tools)</li> <li>6. Explain, describe and analyze the concept of environmentally friendly fishing as a basis for implementing sustainable and responsible fishing</li> </ol>
Content	<p>Some aspects discussed in this course are :</p> <ol style="list-style-type: none"> <li>1. Classification of Fishing Tools and Methods</li> <li>2. Fishing Units and Terms</li> <li>3. Fishing Method with Set Net Type Trap</li> <li>4. Fishing Methods with Other Traps (Sero and Bubu)</li> <li>5. Fishing Method with Purse Seine and Gill Net</li> <li>6. Trawl Fishing Method (Tiger Trawl)</li> <li>7. Method of Fishing with a Line (Line Fishing)</li> <li>8. Fishing Methods with Bagan Fishing Equipment (Lift Net)</li> <li>9. Catching Method with Other Types of Lift Net (Stick Held Dip Net)</li> <li>10. FADs as a Fish Aggregation Device</li> <li>11. Use of Light and Acoustic Technology as Fishing Aids</li> <li>12. Eco-Friendly Fishing Concept</li> <li>13. 13. Illegal Fishing</li> </ol>
Examination Forms	Formative test, Summative Test, Structured Task, Exercise, Journal Review; Project Tasks, and Case Study
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (15%), Quiz (20%) structured task (15%), midterm exam (25%) and final exam (25%)
Reading List	1. Gabriel, O., Lange, K., Dahm, E., & Wendt, T. (Eds.). (n.d.). <i>Fish Catching Methods of the World</i>

	(4th ed.). Oxford: Blackwell Publishing. 2. Sudirman dan Mallawa, A. 2004. Teknik Penangkapan Ikan. PT. Rineka Cipta. Jakarta
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43	
Module designation (Code)	<b>Agricultural Machinery and Equipments(18B01C506)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Dr. Jamaluddin P., MP 2. Nunik Lestari., S.T.P., M.Si 3. Muhammad Rizal, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture, practical work
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Students are able to explain the concept of agricultural tools and machinery (P1)</li> <li>2. Students are able to explain and explain about the types of pre-harvest to harvest activities (KU3)</li> <li>3. Students are able to explain the concept of post-harvest equipment (P1)</li> <li>4. Students are able to operate machines used in pre-harvest to post-harvest activities (S3and KK4)</li> <li>5. Students are able to analyze and solve problems in case studies involving agricultural tools and machines (KU3)</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Power in agriculture</li> <li>3. Agricultural tractors and auxiliary equipment</li> <li>4. Tools and earthmoving machines</li> <li>5. Planting tools and machines</li> <li>6. Plant maintenance tools and machines</li> <li>7. Harvesting tools and machines</li> <li>8. Post-harvest tools and machines (thresher machines)</li> <li>9. Material handling (conveyor) tools and machines</li> <li>10. Cleaning, sorting and grading tools and machines.</li> </ol>
Examination Forms	Formative test; Summative Tests; Journal Review; Project Tasks, Case Study.
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (15%), Quiz (20%) structured task (15%), midterm exam (25%) and final exam (25%)
Reading List	<ol style="list-style-type: none"> <li>1. Ciptohadijoyo, S. 1999. Alat dan Mesin Pertanian. Fakultas Teknologi Pertanian Universitas Gadjah Mada. Jogjakarta.</li> <li>2. Darun, S. Matondang, Sumono. 1983. Pengantar Alat dan Mesin-Mesin Perkebunan. Fakultas Pertanian Universitas Sumatera Utara. Medan.</li> </ol>

	<ol style="list-style-type: none"><li>3. Harris Pearson Smith, A.E., Lambert Henry Wilkes, M. S. 1988. Farm Machinery and Equipment. Tata McGraw-Hill Publishing Company Ltd. New Delhi.</li><li>4. Irwanto, A.K. 1983. Alat dan Mesin Budidaya Pertanian. Fakultas Teknologi Pertanian Institut Pertanian Bogor. Bogor.</li><li>5. Purwadi, T. 1999. Mesin dan Peralatan. Fakultas Teknologi Pertanian Universitas Gadjah Mada. Jogjakarta.</li><li>6. Yasumastha, K. 1988. Farm Machinery Vol. II. Tsukuba International Agricultural Training Course, JICA, Japan.</li></ol>
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44	
Module designation	<b>Agricultural Processing and Preservation Technology(18B01C507)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Dr. Andi Sukainah, S.TP., M.Si 2. RatnawatyFadilah, S.TP., M.Sc 3. ReskiPraja Putra, S.TP., M.Si 4. Amiruddin Hambali, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture, lab work
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. The student will be able to explain the principles and methods of processing using low temperature, high temperature, drying, and frying</li> <li>2. The student will be able to explain the principles and methods of processing using salt, acid, sugar and chemicals, as well as semi-wet food</li> <li>3. The student will be able to explain the principles and methods of fermentation and enzymatic processing</li> <li>4. The student will be able to explain the principles and methods of processing with food irradiation, roasting, microwaves and ohmic, as well as non-thermal processing.</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. Introduction to Processing Technology and Preservation of Agricultural Products</li> <li>2. Drying Principles and Methods</li> <li>3. Frying Principles and Methods</li> <li>4. The Principle of Processing Using Low Temperature</li> <li>5. Principles of High Temperature Processing</li> <li>6. Principles of Non-Thermal Preservation</li> <li>7. Principles of Semi Wet Food Processing</li> <li>8. Principles of Processing Using Salt, Acid, Sugar, and Chemicals</li> <li>9. Principles of Processing by Fermentation</li> <li>10. Principles of Enzymatic Processing</li> <li>11. Principles of Preservation Technology with Irradiation</li> <li>12. Principles of Roasting Technology</li> <li>13. The Principle of Microwave and Ohmic Heating</li> <li>14. Principles of Extrusion Technology</li> </ol>
Examination Forms	Formative test; Summative Tests; Journal Review; Project Tasks, Case Study.
Study and Examination Requirements	Minimum attendance at lectures is 80%. Final score is evaluated based on assignments (30%), midterm exam (30%) and final exam (40%).
Reading List	<ol style="list-style-type: none"> <li>1. Ishak Elly. 2002. Food Science and Technology. Identity of the University of Indonesia.</li> <li>2. Jun S, JM. Irudayaraj. 2009. Food Processing Operations Modeling Design and Analysis, 2nd. CRC Press</li> <li>3. Muchtadi TR, Sugiyono. 2014. Principles of Food Process and Technology. Bandung: Alfabeta</li> </ol>



	<ol style="list-style-type: none"><li>4. Norman W. Desrosier, Ph.D. 1998. Food Preservation Technology. University of Indonesia.</li><li>5. PJ Fellows. 2000. Food Processing Technology. CRC Press</li><li>6. Leni Herliani Afrianti, Dr. Ir. MS. 2014. Food Preservation Technology. Alfabeta.</li><li>7. Rusdin Rauf, S.T.P., M.P. 2002. Food Sanitation. Graha Ilmu.</li></ol>
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45	
Module designation (Code)	<b>Hydroponic Engineering(18B01C508)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Ratnawaty Fadilah, S.TP., M.Sc 2. Nunik Lestari, S.T.P., M.Si 3. Andi Muhammad AkramMukhlis, ST., M.Si
Language	Indonesian
Relation to curriculum	Elective for Agricultural Engineering Specialisation
Teaching methods	Lecture, practical work/project
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Students are expected to be able to explain the concept of hydroponics, greenhouses, and plant factories.</li> <li>2. Students are expected to be able to understand the development of hydroponic technology</li> <li>3. Students are expected to be able to explain and choose planting media for hydroponic systems and prepare nutrient solutions for hydroponic plant cultivation.</li> <li>4. Students are expected to be able to engineer and control the environment for hydroponic systems</li> </ol>
Content	<p>Some aspects discussed in this course are :</p> <ol style="list-style-type: none"> <li>1. The scope of hydroponics</li> <li>2. Conceptions of hydroponics, greenhouses, and industrial plants</li> <li>3. Hydroponic cultivation</li> <li>4. Hydroponic system</li> <li>5. Growing media for hydroponic systems</li> <li>6. Nutrient solution for hydroponics</li> <li>7. Microenvironment engineering</li> <li>8. Control technique for hydroponic system</li> <li>9. Greenhouse design</li> <li>10. Greenhouse construction</li> <li>11. Environmental control of greenhouse plants</li> </ol>
Examination Forms	Oral presentation/essay/quizz/ Practical exam
Study and Examination Requirements	<p>Requirements for successfully passing the module</p> <p>Minimum attendance at lectures is 80%, final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%)</p>
Reading List	<ol style="list-style-type: none"> <li>1. Manodhar. (2007). Greenhouse : Technology &amp; Management, 2nd Edition. BS Publications</li> <li>2. Resh H.M. (2013). Hydroponic Food Production : A Definitive Guidebook for the Advanced Home Gardener and the Commercial Hydroponic Grower. CRC Press</li> <li>3. Sonneveld, C., Voogt W. (2009). Plant Nutrition of Greenhouse Crops. Springer Netherlands.</li> <li>4. Straten, G., Henten, E.J., Willigenburg, L.G., Ooteghem, R.J.C. (2010) Optimal Control of Greenhouse Cultivation. CRC Press</li> <li>5. Zabeltitz, C. (2011). Integrated Greenhouse</li> </ol>

	Systems for Mild Climates: Climate Conditions, Design, Construction, Maintenance, Climate Control. Springer-Verlag Berlin Heidelberg
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46	
Module designation (Code)	<b>Agricultural Machinery Design(18B01C509)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Nunik Lestari., S.T.P,M.Si 2. Andi Muhammad Akram Mukhlis, ST., M.Si 3. Muhammad Rizal, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Elective for Agricultural Engineering Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to explain the basic concepts of agricultural machinery / equipment design (P1) 2. Students are able to explain and explain the basic concepts of the design process of agricultural equipment / machinery (P1) 3. Students are able to design and design agricultural tools and machines as a solution to increasing crop production (KU3) 4. Students are able to calculate power requirements from the design or design of agricultural equipment (S3 and KK4) 5. Students are able to analyze and test the performance of agricultural tools and machines that have been designed (KU3)
Content	1. Introduction 2. The design process 3. Selection of solutions 4. Models and prototypes 5. Functional design 6. Anthropometry of tool design 7. Structural design 8. Design philosophy 9. Calculation of power requirements 10. Engine mechanism 11. Technical analysis in design 12. Engine performance testing
Examination Forms	Formative test; Summative Tests; Journal Review; Project Tasks, Case Study.
Study and Examination Requirements	Requirements for successfully passing the module Minimum attendance at lectures is 80%. Final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%). Minimum final score is 61% ( "C" )
Reading List	1. Budi dan Damar. 2016. Permodelan Perancangan Pabrik. UPT Universitas Sriwijaya: Palembang. 2. Rusdi dan Suyuti. 2017. Perancangan Mesin- Mesin Industri. DEEPUBLISH: Yogyakarta. 3. Sularso & Suga, K. 1997. Dasar-dasar Perencanaan Elemen Mesin. Jakarta : PT. Pradya Paramita.



47	
Module designation (Code)	<b>Agricultural Robotics(18B01C510)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Dr. Jamaluddin P, MP. 2. Khaidir Rahman, S.Pd., M.Pd. 3. Muhammad Rizal, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Elective for Agricultural Engineering Specialisation
Teaching methods	Lecture, project/lab work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Students are able to explain the concept of agricultural robotics</li> <li>2. Students who are able to categorize the types of development-types of robots and their implementation of appropriate technology in agriculture</li> <li>3. Students are able to distinguish between open and closed loop control systems</li> <li>4. Students are able to understand the working principles of Arduino and Nodemcu</li> <li>5. Students are able to analyze the types of sensors that can be used in agricultural control systems</li> <li>6. Students are able to analyze the types of actuators that can be used in agricultural control systems</li> <li>7. Students are able to simulate a series of circuits and coding in the proteus application</li> <li>8. Students are able to develop a minimum system / control system circuit</li> <li>9. Students who are able to perform error / damage analysis of the minimum system / rank control system</li> <li>10. Students are able to develop IoT systems in the agricultural equipment sector</li> <li>11. Students are able to explain the implementation of flying robots in the agricultural sector</li> <li>12. Students are able to develop flying robots that can be implemented in the agricultural sector</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. The concept of agricultural robotics in general</li> <li>2. Types of robots and their implementation in agriculture</li> <li>3. Basic control system</li> <li>4. Arduino / Nodemcu microcontroller</li> <li>5. Sensor</li> <li>6. Actuators</li> <li>7. Circuit simulation and coding with proteus</li> <li>8. Minimal system development</li> <li>9. IoT development</li> <li>10. Development of flying robots</li> </ol>
Examination Forms	Formative test, summative test, product presentation,

	and project task.
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (10%), product presentation (20%), product (20%), midterm exam (20%) and final exam (30%).
Reading List	<ol style="list-style-type: none"> <li>1. Kadir, A. 2016. Simulasi Arduino. PT. Elex Media Komputindo : Jakarta.</li> <li>2. Pitowarno, E. 2007. Robotika: Disain, Kontrol, dan Kecerdasan Buatan. Andi : Yogyakarta.</li> <li>3. Sanjaya, WS. M. 2016. Panduan Praktis Membuat Robot Cerdas Menggunakan ARDUINO &amp; MATLAB. Andi : Yogyakarta.</li> <li>4. Suroso, Indreswari. 2018. Peran Drone dalam Aspek Kehidupan. Deepublish : Yogyakarta.</li> <li>5. Winoto, Ardi. 2010. Mikrokontroler AVR Atmega8/32/16/8535 dan Pemrograman dengan Bahasa C pada WinAVR. Informatika : Bandung.</li> </ol>

48	
Module designation (Code)	<b>Agricultural Building Construction(18B01C511)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Nunik Lestari, S.T.P., M.Si 2. ReskiFebyanti Rauf, S.TP., M.Si 3. Andi Muhammad AkramMukhlis, ST., M.Si
Language	Indonesian
Relation to curriculum	Elective for Agricultural Engineering Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	Mechanics Engineering
Module objectives/intended learning outcomes	1. Understand the elements that make up the building structure 2. Understand the load acting on the building structure 3. Understanding thermal equilibrium in buildings 4. Understand the basic principles of functional planning and environmental control in several agricultural buildings
Content	1. Definition and scope of agricultural buildings 2. Building structure 3. Criteria for design and planning of building structures 4. Calculation of building construction costs pengerjaan 5. Heat spread in buildings 6. Functional building 7. Agricultural environmental systems and their control 8. Farmstead planning 9. Cattle building 10. Grain storage building 11. Cold storage building 12. Frozen storage building 13. Agricultural equipment/workshop building
Examination Forms	Oral presentation/essay/quizz/ Practical exam
Study and Examination Requirements	Requirements for successfully passing the module Minimum attendance at lectures is 80%, final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%)
Reading List	1. Barre, H. J., Sammet, L. L., Nelson, G. L.. (1988). Environmental and Functional Engineering of Agricultural Buildings. Springer US 2. Herren, R.V. (2019). Agricultural Mechanics: Fundamentals and Applications. US : Cengage 3. Zabeltitz, C. (2011). Integrated Greenhouse Systems for Mild Climates: Climate Conditions, Design, Construction, Maintenance, Climate Control. Springer-Verlag Berlin Heidelberg



49	
Module designation (Code)	<b>Agricultural Production Machinery(18B01C512)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Dr. Jamaluddin P, MP 2. Nunik Lestari, S.T.P., M.Si 3. ReskiFebyanti Rauf, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Elective for Agricultural Engineering Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	1. Students are able to explain the theory and understanding of agricultural product processing techniques 2. Students are able to explain about activities in processing agricultural products 3. Students are able to explain and operate the machines used in handling agricultural products 4. Students are able to design agricultural machines for certain agricultural products 5. Students are able to solve problems related to product handling and agricultural production machines.
Content	1. Material handling machines 2. Cleaning, sorting and grading machines 3. Size reduction and sieving machines 4. Drying machines 5. Refrigeration and freezing machines 6. Cutting/slicing machine
Examination Forms	Oral presentation/essay/quizz
Study and Examination Requirements	Requirements for successfully passing the module Minimum attendance at lectures is 80%, final score is evaluated based on assignments (10%), practical (20.%), midterm exam (30%) and final exam (40%)
Reading List	1. Henderson, S.M., R.L. Perry, J.H. Young. 1997. Principle of Process Engineering. ASAE. USA. 2. Heldman, Dennis R and Paul Singh, R. 1980. Food Process Engineering. The AVI Publishing. Company Inc 3. James G. Brennan. 2006. Food Processing Handbook. WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

50	
Module designation (Code)	<b>Drainage and Irrigation Engineering(18B01C513)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Reski Febyanti Rauf, S.TP., M.Si 2. Andi Muhammad Akram Mukhlis, ST., M.Si 3. Muhammad Rizal, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Elective for Agricultural Engineering Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	Applied Physics, Fluid Mechanics
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. The students will be able to understand about irrigation systems, classification, types, and sources of water for agricultural irrigation</li> <li>2. The student will be able to understand about the drainage system, classification, types, and design of agricultural drainage</li> <li>3. The student will be able to master the calculation equations in building irrigation and drainage</li> <li>4. The student will be able to design irrigation and agricultural drainage channels</li> </ol>
Content	<p>Some aspects discussed in this course are :</p> <ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Concept of Soil Plant Atmosphere Continuum (SPAC)</li> <li>3. Concept of Land and Water Relations</li> <li>4. Concept of Water Availability for Plants</li> <li>5. Agricultural Irrigation Water Availability</li> <li>6. Irrigation Efficiency</li> <li>7. Bulk Irrigation Design I</li> <li>8. Bulk Irrigation Design II</li> <li>9. Drainage Effect</li> <li>10. Drainage Modulus</li> <li>11. Peak Discharge Equations and Methods I</li> <li>12. Peak Discharge Equations and Methods II</li> <li>13. Plan Discharge Equations and Methods</li> <li>14. Exhaust Duct Dimensions</li> </ol>
Examination Forms	Formative test; Summative Tests; Journal Review; Project Tasks, Case Study
Study and Examination Requirements	<p>Requirements for successfully passing the module:</p> <ol style="list-style-type: none"> <li>1. Minimum attendance at lectures is 80%.</li> <li>2. Final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%).</li> <li>3. Minimum final score is 61% ( "C" )</li> </ol>
Reading List	<ol style="list-style-type: none"> <li>1. Doorenbos.,J and W.O. Pruitt. 1977,. Guidelines for Predicting Crop Water Requirement. Irrigation and Drainage No 24. Rome.</li> <li>2. Departemen Pekerjaan Umum,. 1986,. Standar Perencanaan Irigasi. Direktorat Jenderal</li> </ol>

	<p>Pengairan. Jakarta.</p> <ol style="list-style-type: none"><li>3. Hansen, V.E., O.W. Israelsen and G.E Stringham. 1986. Dasar-dasar dan Praktek Irigasi. Terjemahan Endang P.T. Erlangga. Jakarta.</li><li>4. Kalsim,.D.K. 2002. Rancangan Irigasi Gravitasi, Drainase dan Infrastruktur. Bagian Teknik Tanah dan Air. Departemen Teknik Pertanian. IPB Bogor.</li><li>5. Kalsim,.D.K. 1995. Teknik Drainase Permukaan (penentuan debit rancangan dan debit puncak). Laboratorium Teknik Tanah dan Air. Departemen Teknik Pertanian. IPB Bogor.</li><li>6. Kertasapoetra, A.G.,MM Sutedjo dan E Pollein.,1994. Teknologi Pengairan Pertanian (Irigasi). Bumi Aksara.Jakarta.</li><li>7. Prastowo. 2003. Materi Pelatihan Aplikasi Teknologi Irigasi Spinkler dan Drip. CERATA-LP IPB. Bogor</li><li>8. Prastowo dan Liyantono., 2002. Prosedur Desain Irigasi tetes. Bagian Teknik Pertanian. IPB Bogor.</li></ol>
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51	
Module designation (Code)	<b>Evaluation of Agricultural Product Nutrition (18B0IC514)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	<ol style="list-style-type: none"> <li>1. Dr. Andi Sukainah, S.TP., M.Si</li> <li>2. Ratnawaty Fadilah, S.TP., M.Sc</li> <li>3. Reski Praja Putra, S.TP., M.Si</li> <li>4. Amiruddin Hambali, S.TP., M.Si</li> </ol>
Language	Bahasa Indonesia
Relation to curriculum	Elective for Food Technology Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Able to explain nutritional value in raw food ingredients</li> <li>2. Able to explain the effect of processing and storage on nutrients</li> <li>3. Able to explain the method of nutrient addition formulation and nutrient metabolism</li> <li>4. Able to explain the effect of food service preparation and catering services on nutrition</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. Introduction to Nutritional Evaluation of Agricultural Products</li> <li>2. Effect of Agricultural Cultivation on Food Nutrition</li> <li>3. Effect of Harvesting and Handling on Food Nutrition</li> <li>4. Genetic Manipulation and Effects of Purification on Food Nutrition</li> <li>5. Effect of Heat Processing on Food Nutrition</li> <li>6. Effect of Preserving Frozen and Decreasing Water Content on Food Nutrition</li> <li>7. Effect of Fermentation, Additives, and Ionizing Radiation on Food Nutrition</li> <li>8. Nutritional Fortification and Factors Affecting Nutritional Metabolism</li> <li>9. Effect of Packaging on Nutrients</li> <li>10. Effect of Food and Service Preparation on Nutrients</li> </ol>
Examination Forms	Minimum attendance at lectures is 80%, final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%).
Study and Examination Requirements	<p>Requirements for successfully passing the module;</p> <p>Minimum attendance of both, lectures and practicum, is 80%; Students are required to pass practicum, with a minimum score of 85.</p> <p>The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)</p>
Reading List	<ol style="list-style-type: none"> <li>1. Nielsen SS. 2010. Food Analysis Laboratory Manual, 2<sup>nd</sup>. New York : Springer. (177 Halaman)</li> <li>2. Weaver CM. Daniel, JR. 2005. The Food Chemistry Laboratory : a Manual for Experimental</li> </ol>

	<p>Foods, Dietetics, and Food Scientists, 2<sup>nd</sup> . New York : CRC Press. (137 Halaman)</p> <ol style="list-style-type: none"><li>3. AOAC. 1995. Official Methods of Analysis of the Association of Official Analytical Chemist. Association of Official Analytical Chemists, Washington, DC.</li><li>4. McLandsborough, LA. Food Microbiology Laboratory. New York : CRC Press</li><li>5. Otlis S. 2009. Handbook of Food Analysis Instruments. CRC Press</li><li>6. Nielsen SS., 2010. Food Analysis. 4<sup>th</sup> . Springer Science+Business Media, LLC</li><li>7. Otlis S. 2005. Methods of Analysis of Food Components and additives. Taylor &amp; Francis Group, LLC</li><li>8. Marwaha K., 2010. Control and Analysis for Food and Agricultural Products. New Delhi : Gene Tech Books</li></ol>
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52	
Module designation (Code)	<b>Fermentation Technology(18B01C515)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Dr. Andi Sukainah, STP., MSi 2. Ratnawaty Fadilah, S.TP., M.Sc 3. Reski Praja Putra, S.TP., M.Si 4. Amiruddin Hambali, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Elective for Food TechnologySpecialisation
Teaching methods	Lecture, Lab work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit ponits	2
Required and recommended prerequisites for joining the module	-
Module onjectives/intended learning outcomes	College students are expected to master the competency standards: 1. Able to explain microbial metabolic activity 2. Able to explain the isolation technique, fermentation medium and inoculum, as well as fermentation method and kinetics 3. Able to explain working principle of the fermenter and properties of fermentation 4. Able to explain process and mechanism of fermentation in fermented food products
Content	1. <b>Introduction of Fermentation Technology</b> :history development and role of fermentation technology 2. <b>Microbial Metabolic Activity</b> :energy requirements for microbes; breakdown of carbohydrates; regular metabolism 3. <b>Microbial Metabolic Activity</b> :metabolic biosynthesis; modification of metabolism 4. <b>Isolation and Culture Maintenance</b> :isolate culture; maintenance of culture 5. <b>Fermentation Medium</b> :physical properties, component, and formulation of the medium; requirement and administration of submerged culture oxygen; sterilization medium 6. <b>Fermented Inoculum</b> :yeast, bacterial, and mold cell inoculum; inoculum in food fermentation 7. <b>Methods and Kinetics of Fermentation</b> :closed system fermentation; continuous fermentation; fed-batch fermentation 8. <b>Fermenter (Bioreactor)</b> :achievement and maintaining aseptic conditions; fermenter (bioreactor) structure and type 9. <b>Process Controls and Instruments</b> :physical and chemical environment parameters; control system 10. <b>Fermented Vegetables, Fruits, Legumes, Cereals, and Tubers</b> :vegetable, fruit, and legume fermented products 11. <b>Fermented Vegetables, Fruits, Legumes, Cereals, and Tubers</b> :cereal and tuber fermentation products 12. <b>Fermented Milk, Fish and Meat Products</b> : milk fermented products 13. <b>Fermented Milk, Fish and Meat Products</b> : fish and meat fermented products

	14. <b>Fermented Tea, Coffee and Cocoa</b> : fermented tea; coffee and cocoa fermentation
Examination Forms	Oral presentation/essay/multiple choices/quizz/practical exam
Study and Examination Requirements	<p>Requirements for successfully passing the module;</p> <p>Minimum attendance of boths, lectures and practicum, is 80%; Students are required to pass practicum, with a minimum score of 85.</p> <p>The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)</p>
Reading List	<ol style="list-style-type: none"> <li>1. Rahman, A. 1992. Teknologi Fermentasi. Jakarta : Arcan</li> <li>2. Rahman, A. 1992. Teknologi Fermentasi Industrial. Jakarta : Arcan</li> <li>3. Daulay, D., A. Rahman. 1992. Teknologi Fermentasi Sayuran dan Buah-Buahan. Bogor : Departemen Pendidikan dan Kebudayaan Direktorat Jenderal Pendidikan Tinggi Pusat Antara Universitas Pangan dan Gizi, Institut Pertanian Bogor</li> <li>4. Riadi, L. 2013. Teknologi Fermentasi Edisi 2. Yogyakarta : Graha Ilmu</li> <li>5. Bamforth CW. 2005. Food, Fermentation, and Micro-organisms. UK : Blackwell Publishing</li> <li>6. Purwoko, T. 2009. Fisiologi Mikroba. Jakarta : Bumi Aksara</li> <li>7. Tamang JP, K. Kailasapathy. 2010. Fermented Foods and Beverages of The World. USA : CRC Press</li> <li>8. Stanbury PF, A. Whitaker, SJ. Hall. 2003. Principles of Fermentation Technology 2<sup>nd</sup>. Butterworth-Heinemann, Elsevier Science.</li> <li>9. Hutkins RW. 2006. Microbiology and Technology of Fermented Foods. UK : Blackwell Publishing</li> <li>10. Katz SE. 2003. Wild Fermentation : The Flavor, Nutrition, and Craft of Live-Culture Foods. United States : Sandor Ellix Katz</li> </ol>

53	
Module designation (Code)	<b>Herbal Food Processing Technology(18B01C516)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Dr. Andi Sukainah, STP., MSi 2. Ratnawaty Fadilah, S.TP., M.Sc 3. Reski Praja Putra, S.TP., M.Si 4. Amiruddin Hambali, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Elective for Food Technology Specialisation
Teaching methods	Lecture, Lab work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	College students are expected to master the competency standards: 1. Able to explain classification, structure, and benefits of herbal bioactive compounds for health 2. Able to understand and explain about herbal bioactive compounds sourced from fruit, vegetables and tubers, cereals and legumes, spices and seasonings, and marine products as well as extraction process for their bioactive components. 3. Able to understand and explain about factors that influence herbal bioactive compounds both during harvest and processing process 4. Able to understand and explain stability of herbal bioactive compounds during processing process, storage, fortification process, and formulation of herbal food products.
Content	1. <b>Introduction</b> :definition and scope of herbal food processing technology 2. <b>Classification, Chemical Structure, and Benefits of Bioactive Herbs for Health</b> :classification, chemical structure, and benefit of herbal bioactive compounds 3. <b>Sources of Herbal Bioactive Compounds</b> :herbal bioactive compounds from fruits, vegetables, tubers, cereals and legumes 4. <b>Sources of Herbal Bioactive Compounds</b> :herbal bioactive compounds from spices, seasonings, and marine products 5. <b>Extraction of Herbal Bioactive Compounds</b> :extraction theory and principles; conventional techniques (roots, leaves, stems, flowers, fruits) and simplicial; the newest extraction technique (supercritical fluid extraction) 6. <b>Factors for Handling and Management of Fresh Products Against Herbal Bioactive Compounds</b> :influencing factors during pre-harvest; practical management factors during harvest and post harvest; prospects for the future 7. <b>Minimum Vegetable Processing Factor</b> :minimal processed products; cutting and tearing; physiological changes due to injury; browning on the leaves; cold temperature storage and atmospheric modification 8. <b>Process Factors by Heating</b> :blanching,



	<p>pasteurization, sterilization, fryer</p> <p>9. <b>Recent Heating Processing Factors</b> :differences in processing methods of fruit and vegetables; ohmic and microwave heating; radio frequency (electromagnetic waves)</p> <p>10. <b>Non-Heat Processing Factors</b> :irradiation, high pressure, ozone, and ultrasound process; giving an electric field; supercritical carbon dioxide</p> <p>11. <b>Stability during Cereal Processing</b> :germination, milling, fermentation, grill, burning, extrusion process, half-baked</p> <p>12. <b>Factors Affecting Stability</b> :effect of pH and concentration, processing, enzymes, structure, copigment, matrix, and storage conditions</p> <p>13. <b>Stability of Herbal Bioactives during Product Storage</b> :stability of herbal bioactive compounds during storage; application on food; storage edible packaging with modified atmosphere; bioactive packaging and microencapsulation</p> <p>14. <b>Phytonutrients (Bioactive Herbs) Fortified Foods and Beverages</b> :demonstration of functional effects; types of food and drinks that can be fortified; product stability; analytical methods that can be used; product quality management</p>
Examination Forms	Oral presentation/essay/multiple choices/quizz/practical exam
Study and Examination Requirements	<p>Requirements for successfully passing the module;</p> <p>Minimum attendance of boths, lectures and practicum, is 80%; Students are required to pass practicum, with a minimum score of 85.</p> <p>The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)</p>
Reading List	<ol style="list-style-type: none"> <li>1. Peter KV. 2000. Handbook of Herbs and Spices, Vol. 2. CRC Press</li> <li>2. Tiwari BK, Brunton NP, Brennan CS. 2013. Handbook of Plant Food Phytochemicals : Sources, Stability and Extraction. Wiley-Blackwell</li> <li>3. Meireles MAA. 2009. Extracting Bioactive Compounds for Food Products : Theory and Applications. CRC Press</li> <li>4. Kumar DS. 2016. Herbal Bioactives and Food Fortification : Extraction and Formulation. CRS Press</li> <li>5. Weil's A. Consumer Guide to Herbal Medicine</li> <li>6. Losso JN., F. Shahidi, D. Bagchi. 2007. Anti-Angiogenic Functional and Medicinal Foods. CRC Press</li> <li>7. Gilbert J., HZ. Senyuva. 2008. Bioactive Compounds in Foods. Blackwell Publishing</li> </ol>

54	
Module designation (Code)	<b>Quality Management and Food Regulation(18B01C517)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Dr. Ir. Nur Rahmah, M.Si 2. Ratnawaty Fadilah, S.TP., M.Sc 3. Reski Praja Putra, S.TP., M.Si 4. Amiruddin Hambali, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Elective for Food Technology Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	1. Able to explain about the quality of food, damage and deterioration of food quality, food quality control and quality control 2. Able to explain and discuss quality standardization, as well as quality control and food safety programs 3. Able to explain and discuss Hazard Analysis Critical Control Point (HACCP) 4. Able to explain about quality certification, food regulation and halal product assurance
Content	This course discusses the quality of food, damage and degradation of food quality, food quality control and quality control. This course also explains about quality standardization, as well as quality control and food safety programs as well as Hazard Analysis and Critical Control Point (HACCP). In addition, this course also provides material on quality certification, food regulation and halal product assurance
Examination Forms	Oral presentation/essay/multiple choices/ quizz/practical exam
Study and Examination Requirements	Requirements for successfully passing the module; Minimum attendance of lectures is 80%; The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)
Reading List	1. Mamujaja, CF., 2016. Pengendalian mutu dan keamanan pangan. Unsrat Press 2. Mashudi. 2015. Konstruksi Hukum dan Respons Masyarakat Terhadap Sertifikasi Produk Halal : Studi Socio-legal Terhadap Lembaga Pengkajian Pangan, Obat-obatan, dan Kosmetika Majelis Ulama Indonesia. Yogyakarta: Pustaka Pelajar 3. Redaksi Sinar Grafika. 2013. Undang-Undang Pangan 2012 (UU RI No. 18 Tahun 2012. Jakarta : Sinar Grafika 4. Redaksi Sinar Grafika. 2015. Undang-Undang Jaminan Produk Halal, UU RI No. 33 Tahun 2014. Jakarta : Sinar Grafika



55	
Module designation (Code)	<b>Food Fortification Technology(18B01C518)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Dr. Andi Sukainah, S.TP., M.Si 2. Ratnawaty Fadilah, S.TP., M.Sc 3. Reski Praja Putra, S.TP., M.Si 4. Amiruddin Hambali, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Elective for Food Technology Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	College students are expected to master the competency standards: 1. Able to explain about nutrient fortification technology in agricultural products 2. Able to understand and explain about the technology for fortification of nutrients in food products: food, beverages, and seasoning products 3. Able to understand and explain about dietary supplement formulation 4. Able to understand and explain about phytochemical fortification technology in food products
Content	1. <b>Introduction</b> :definition and scope of food fortification technology 2. <b>Fortified Egg</b> :Fortified for Comprehensive Nutritional and Health Support 3. <b>Apple Pomace</b> :Source of Dietary Fibre and Antioxidant for Food Fortification 4. <b>Fortified Food Made from Animal Products</b> :From Product Design to Nutritional Intervention 5. <b>Dietary Lipid Sources as a Means of Changing Fatty Acid Composition in Fish</b> : Implications for Food Fortification 6. <b>Fortified Meat and Meat Products</b> : Enriched with n-3 Fatty Acids 7. <b>Cheese Fortification</b> 8. <b>Yogurt Fortified with Date Fiber</b> 9. <b>Convenience Drinks Fortified with n-3 Fatty Acids</b> 10. <b>Evaporated Sugarcane Juice as a Food Fortificant</b> 11. <b>Fortification of Fish Sauce and Soy Sauce</b> 12. <b>Formulation of Food Supplements</b> 13. <b>Food Fortified with Phytonutrients</b> 14. <b>Beverages Fortified with Phytonutrients</b>
Examination Forms	Oral presentation/essay/multiple choices/quizz/practical exam
Study and Examination Requirements	Requirements for successfully passing the module; Minimum attendance of boths, lectures and practicum, is 80%; Students are required to pass practicum, with a minimum score of 85. The learning outcomes assessment consists of midterm

	exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)
Reading List	<ol style="list-style-type: none"> <li>1. Preedy VR., R. Srirajaskanthan, VB. Patel. 2013. Handbook of Food Fortification and Health : From Concepts to Public Health Applications 2<sup>nd</sup>. Humana Press</li> <li>2. Kumar DS. 2016. Herbal Bioactives and Food Fortification Extraction and Formulation. CRC Press</li> <li>3. Ottaway PB. 2008. Food Fortification and Supplementation : Technological, Safety and regulatory Aspects. CRC Press</li> <li>4. Institute of Medicine of The National Academies. 2003. Dietary Reference Intakes : Guiding Princioles for Nutrition Labeling and Fortification. The National Academies Press</li> <li>5. Allen L, B. de Benoist, O. Dary, R. Hurrell. 2006. Guidelines on Food Fortification with Micronutrients. World Health Organization and Food and Agriculture Organization of the United Nations</li> <li>6. Mannar MG., RF. Hurrell. 2018. Food Fortification in a Globalized World. Academic Press</li> <li>7. Lawrence M. 2013. Food Fortification The Evidence, Ethics, and Politics of Adding Nutrients to Food. Oxford University Press</li> <li>8. Preedy VR., RR. Watson, VB. Patel. 2011. Flour and Breads and their Fortification in Health and disease Prevention</li> </ol>

56	
Module designation (Code)	<b>Plantation Product Processing Technology(18B01C519)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Dr. Ir. Nur Rahmah, M.Si 2. Reski Praja Putra, S.TP., M.Si 3. Amiruddin Hambali, S.TP., M.Si 4. Diyahwati, S.TP., M.Pd
Language	Indonesian
Relation to curriculum	Elective for Food Technology Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	College students are expected to master the competency standards: 1. Able to understand and explain about the technology of handling and post-harvesting of fruit, coffee beans and processing of coffee grounds 2. Able to understand and explain about cocoa bean post-harvest handling and processing technology, cocoa butter processing technology and cocoa powder 3. Able to understand and explain about sugarcane processing technology into sugar 4. Able to understand and explain about the technology of handling and processing tea and tea products 5. Able to understand and explain about palm oil handling and processing technology 6. Able to understand and explain about coconut handling and processing technology
Content	1. <b>Introduction</b> :definition and scope of plantation product processing technology 2. <b>Coffee Fruit Post Harvest Handling Technology</b> : classification of coffee cherries (arabica, robusta, liberika), sorting, and maturity level of coffee cherries 3. <b>Coffee Fruit Processing Technology into Beans:</b> dry and wet processes through the fermentation process 4. <b>Ground Coffee Processing Technology</b> 5. <b>Cocoa Fruit Post Harvest Handling Technology</b> :classification of cocoa pods (Lindak and Forestero), sorting, and maturity level of cocoa pods 6. <b>Cocoa Fruit Processing Technology:</b> cocoa Fruit Fermentation Process 7. <b>Cocoa Fat and Cocoa Powder Processing Technology</b> 8. <b>Tea Post Harvest Handling Technology :</b> 9. <b>Tea Processing Technology:</b> tea leaf fermentation process, green tea, black tea 10. <b>Sugarcane Post Harvest Handling Technology</b> 11. <b>Sugarcane Processing Technology into Sugar:</b>

	<p>milling, refining, evaporation, cooking, and spinning processes</p> <p>12. <b>Palm Oil Post Harvest Handling Technology</b></p> <p>13. <b>Palm Oil Processing Technology</b></p> <p>14. <b>Coconut Product Processing Technology</b></p>
Examination Forms	Oral presentation/essay/multiple choices/quizz/practical exam
Study and Examination Requirements	<p>Requirements for successfully passing the module;</p> <p>Minimum attendance of boths, lectures and practicum, is 80% ; Students are required to pass practicum, with a minimum score of 85.</p> <p>The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)</p>
Reading List	<ol style="list-style-type: none"> <li>1. Nehlig A. 2004. Coffe, Tea, Chocolate, and the Brain. CRC Press</li> <li>2. Beckett ST. 2000. The Science of Chocolate. RSC Paperbacks</li> <li>3. Nampoothiri KUK, V. Krishnakumar, PK. Thampan, MA. Nair. 2018. The Coconut Palm (<i>Cocos nucifera L.</i>)- Research and Development Perspectives. Springer</li> <li>4. Suzuki k, K.Ishii, S. Sakurai, S. Sasaki. 2006. Plantation Technology in Tropical Forest Science. Springer</li> <li>5. Ho CT, JK. Lin, F. Shahidi. 2009. Tea and Tea Products Chemistry and Helath-Promoting Properties. CRC Press</li> <li>6. Afoakwa E. 2010. Chocolate Science and Technology. Wiley-Blackwell</li> <li>7. Corley RHV, PB. Tinker. The Oil Palm 4<sup>th</sup>. Blackwell Science</li> <li>8. Rein P. 2007. Cane Sugar Engineering.</li> <li>9. Fife B, CS. Dayrit. 2005. Coconut Cures Preventing and Treating Common Helath Problems with Coconut. Piccadilly Books, Ltd.</li> </ol>

57	
Module designation (Code)	<b>Fish Feed(18B01C520)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Prof. Dr. Patang, S.Pi., M.Si 2. Amirah Mustarin, S.Pi., M.Si 3. Marhayati, S.Pi., M.Pd
Language	Indonesian
Relation to curriculum	Elective for Aquatic Science Specialisation
Teaching methods	Lecture, lab work, field work, field trip, self study, discussion
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	Aquaculture Technology, Fish Hatchery Technology
Module objectives/intended learning outcomes	Students are able to formulate, make feed and manage fish feeding
Content	1. Determination of nutrient requirements based on commodities, life cycle, and habitat 2. Determination of the fish feed quality 3. Formulation and making quality feed with minimal cost (least cost formulation) 4. Production of various forms of feed 5. Managing feeding properly and correctly
Examination Forms	Oral presentation, essay, quizz, Practical exam, assignments
Study and Examination Requirements	Requirements for successfully passing the module; Minimum attendance of boths, lectures and practicum, is 80%; The learning outcomes assessment consists of midterm exams (30%), final exams (40%), structured assignments (10%), practicum (20%)
Reading List	1. E. Halver and W. Hardy. 2002. Fish Nutrition. Third Edition. USA: Academic Press. 2. Gede Ari Yudasmara, 2014, Biologi Perikanan. Plantasia, Singaraja. 3. Produksi Pakan Alami, 2013. Direktorat Pembinaan SMK Kementerian Pendidikan dan Kebudayaan, Jakarta. 4. Feed Formulation and Feeding Practices in Fish Culture. 2002. National Agricultural Extension and Research Liaison Services, Ahmadu Bello University, Zaria. 5. Pusat pendidikan Kelautan dan perikanan, Kemeterian Kelautan dan Perikanan. 2015. Modul: Meramu Pakan Ikan.



58	
Module designation (Code)	<b>Fish Disease(18B01C521)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Prof. Dr. Patang, S.Pi., M.Si 2. Amirah Mustarin, S.Pi., M.Si 3. Marhayati, S.Pi., M.Pd
Language	Indonesian
Relation to curriculum	Elective for Aquatic Science Specialisation
Teaching methods	Lecture, lab work, field work, field trip, self study, discussion
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	Aquaculture Technology, Fish Hatchery Technology
Module objectives/intended learning outcomes	Students are able to recognize fish diseases, know the source and types of fish diseases, know how to diagnose fish diseases, recognize prevention and treatment of fish diseases
Content	<ol style="list-style-type: none"> <li>1. Definition and scope of fish disease</li> <li>2. The interaction of fish with the environment</li> <li>3. causes of fish disease and the source and type of disease</li> <li>4. non-infectious and infectious diseases</li> <li>5. fish body parts that are attacked by disease</li> <li>6. How to diagnose fish disease</li> <li>7. prevention of fish diseases and handling of sick fish</li> <li>8. immunostimulant, probiotic, fish vaccination</li> <li>9. The disease control : parasites, bacteria, viruses and fungi</li> </ol>
Examination Forms	Oral presentation, essay, quizz, Practical exam, assignments
Study and Examination Requirements	<p>Requirements for successfully passing the module;</p> <p>Minimum attendance of boths, lectures and practicum, is 80%;</p> <p>The learning outcomes assessment consists of midterm exams (30%), final exams (40%), structured assignments (10%), practicum (20%)</p>
Reading List	<ol style="list-style-type: none"> <li>1. Chahaya, S. I. 2003. Fish as a Pollution Monitoring Tool. Thesis. Department of Environmental Health, Faculty of Public Health. Universitas Sumatera Utara. SumateraUtara</li> <li>2. Daryanto. 1995. Pollution Problem. Tarsito. Bandung</li> <li>3. Effendie, M. I. 1997. <i>Fisheries Biology</i>. Yayasan Pustaka Nusatama. Bogor.</li> <li>4. Effendi, H. 2003. Water quality assessment: For the management of aquatic resources and environment. Kanisius. Yogyakarta</li> <li>5. Evan, Y. 2009. Endurance Test of Several Strains of Giant Prawn Larvae (<i>Macrobrachium rosenbergii</i> de Man) Terhadap Bakteri <i>Vibrio harveyi</i>. Thesis. Bogor: Institut Pertanian Bogor.</li> <li>6. Halang, B. (2004). Toxicity of Detergent Wastewater to Carp (<i>Cyprinus Carpio</i> L). Unlam</li> </ol>

	pres, Vol 1(1) : 39-49
7.	Lu, F.C. 2006. Basic Toxicology Target Organ Principles and Risk Assessment. UI-Press.
8.	Mangkoedihardjo dan Samudro, G. (2009). Ekotoksikologi Teknosfer. Guna Widya. Surabaya

59	
Module designation (Code)	<b>Planktonology(18B01C522)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Prof. Dr. Patang, S.Pi., M.Si 2. Dr. ErnawatiSyahrudinKaseng, S.Pi., M.Si 3. Indrayani, S.Pi, M.Biotech.Stu, Ph.D 4. Andi AlamsyahRivai, S.Pi., M.Si
Language	Indonesian
Relation to curriculum	Elective for Aquatic Science Specialisation
Teaching methods	Lecture, field and lab works
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit ponits	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	1. Students know and are able to explain basic knowledge of plankton (phytoplankton and zooplankton), distribution, physiology and limits to growth factors of phytoplankton,bioecology and classification of plankton 2. Students know how to do sampling, identification and determination of ecological aspects/community structure of plankton 3. Students are able to do basic research related to plankton
Content	Some aspects discussed in this course are : 1. Definition of planktonology, coverage of planktonology, limitations of the discussion of planktonology, 2. Distribution of plankton in relation to the environment 3. Factors affecting the survival and growth of phytoplankton 4. Physiology of phytoplankton 5. Diatoms (Bacillariophyceae) 6. Phylum Dinophyta, Haptophyta and Euglenophyta, 7. Phylum glaucophyta, cryptophyta 8. Phylum chlorophyta 9. Phylum cyanophyta 10. Zooplankton (definition, characteristics and the main classes of zooplankton) 11. Zooplankton group Crustacea, Protozoa, Mollusca, Annelida 12. The position of zooplankton as the first level of consumers, distribution, growth, reproduction as well as the ecological and economical benefits of zooplankton 13. The phenomenon of red tides / HABs 14. Phytoplankton and global warming
Examination Forms	Oral presentation/essay/quizz/ Practical exam/assignments
Study and Examination Requirements	Requirements for successfully passing the module Minimum attendance at lectures is 80%, final score is evaluated based on assignments (10%), practical (20%), midterm exam (30) and final exam (40%)
Reading List	1. Andersen RA. 2005. Algal culturing techniques. Elseviser Academic Press, London, p589 2. Barsanti L, Gualtieri P. 2006. Algae: Anatomy,

	<p>Biochemistry and Biotechnology. Taylor and Francis, Boca Raton, New York, p320</p> <ol style="list-style-type: none"><li>3. Borowitzka MA, Beardall J, Raven JA. 2016. The physiology of microalgae. Springer, Dordrecht, p673.</li><li>4. John J (2012) A beginner's guide to diatoms. A.R.G. Gantner, Ruggel, Liechtenstein, Germany.</li><li>5. Richmond A, Hu Q. 2013. Handbook of microalgal culture: applied phycology and biotechnology. Wiley-Blackwell, UK, p719</li><li>6. Stoermer EF, Smol JP (2004) The diatoms: Applications for environmental and earth sciences. Cambridge University Press, Cambridge.</li><li>7. Tomas CR (1996) Identifying marine diatoms and dinoflagellates. Academic Press, Ink, California.</li><li>8. Van Den Hoek C, Mann DG, Jahns HM (1995) Algae: An introductory to phycology. Cambridge University Press, Cambridge.</li></ol>
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60	
Module designation (Code)	<b>Aquatic Ecology(18B01C523)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Dr. Hj. Ernawati Syahrudin K. S.Pi., M.Si. 2. Amirah Mustarin, S.Pi.,M.Si. 3. A. Alamsyah Rivai, S.Pi.,M.Si.
Language	Indonesian
Relation to curriculum	Elective for Aquatic Science Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	Students will be able to understand the concept of aquatic ecology and the influencing factors and threats to aquatic ecosystems and ultimately understand the planning of water resources management based on the nature and ecological potential of these resources.
Content	1. Introduction and scope of aquatic ecosystem ecology 2. Marine environment zoning 3. Ecological Properties of Ecosystem Type 4. Utilization Impact of human activities on ecosystem 5. Freshwater Ecology 6. Ecological Characteristics of Ecosystem Type 7. Role of Ecosystem
Examination Forms	Oral presentation/essay/quizz/ Practical exam/assignments
Study and Examination Requirements	Requirements for successfully passing the module Minimum attendance at lectures is 80%, final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%)
Reading List	1. Johanes, 2008. Management of marine fisheries resources, Gajah Mada University Press, Yogyakarta. 2. Press, A., & Bulletin, W. S. (2015). Environmental Management and Governance: Advances in Coastal and Marine Resources (Vol. 8). Switzerland 2015: Springer. 3. Bartlett, D., & Celliers, L. (2017). Geoinformatics for Marine and Coastal Management. Boca Raton: CRC Press: Taylor & Francis Group. 4. Moksness, E., Dahl, E., & Støttrup, J. (2013). Global Challenges In Integrated Coastal Zone Management. West Sussex: Wiley-Blackwell. 5. Ramanathan, A., Bhattacharya, P., Dittmar, T., Prasad, M. B. K., & Neupane, B. R. (2010). Management and Sustainable Development of Coastal Zone Environments. Springer Netherlands. 6. Ruddle, K., & Satria, A. (2010). Managing Coastal and Inland Waters: Pre-existing Aquatic Management Systems in Southeast Asia. New York: Springer US.

	7. MacDonald, B. H., Soomai, S. S., Santo, E. M. De, & Wells, P. G. (2016). Science, Information, and Policy Interface for Effective Coastal and Ocean Management. Boca Raton: CRC Press: Taylor & Francis Group
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61	
Module designation (Code)	<b>Marine Biology(18B01C524)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Dr. Hj. Ernawati Syahrudin K. S.Pi., M.Si. 2. Amirah Mustarin, S.Pi.,M.Si.
Language	Indonesian
Relation to curriculum	Elective for Aquatic Science Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	Students are able to explain biological and ecological aspects of marine waters as a fishery biological resource and capable of discusses the world of marine life in general based on the characteristics and principles biology that regulates the organization and survival of organisms and their associations in ecological zones
Content	1. Introduction 2. Ecological and biological aspects of Indonesian marine waters 3. Marine biota 4. Marine plants and animals 5. Marine biogeochemical cycle and primary productivity 6. Beach zone 7. Coastal Zone 8. Marine biology research methodology
Examination Forms	Oral presentation/essay/quizz/ Practical exam/assignments
Study and Examination Requirements	Requirements for successfully passing the module Minimum attendance at lectures is 80%, final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%)
Reading List	1. Allen, G.R. 2004. Tropical coral reef fishes of Indonesia. Periplus Editions (HK) Ltd. Singapore 2. Bengen D.G. 1999. Introduction and Management of Mangrove Ecosystems. PKSPL-IPB. Bogor. 3. Fiene-Severns, P., nM. Severns and R. Dyerly. 2004. Tropical Seashells of Indonesia. Periplus Editions (HK) Ltd. 4. Singapore 5. Hutabarat S., and Evans. 1980. Introduction to Oceanography. UI Press. Jakarta. 6. Nybaken W. 1988. Marine Biology. An Ecological Approach. PT. grammar. Jakarta 7. Odum, E. 1998. Fundamentals of Ecology. Gajah Mada University Press. Yogyakarta. 8. Romimohtarto K., and Sri Juwana. 2005. Marine Biology. Marine Biology Science. Bridge. Jakarta 9. Tomascik T., A.J. Mah, A. Nontji, M.K. moosa. 1997. The Ecology of The Indonesian Seas I and





62	
Module designation (Code)	<b>Project Evaluation and Business Planning(18B01C525)</b>
Semester (s) in which the module is taught	5
Person responsible for the module	1. Prof. Dr. Patang, S.Pi., M.Si 2. Amirah Mustarin, S.Pi., M.Si 3. Marhayati, S.Pi., M.Pd
Language	Indonesian
Relation to curriculum	Elective for Aquatic Science Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	Students are able to explain and performe financial analysis and economic analysis in the field of fisheries
Content	1. project cycle 2. technical aspects of the project 3. instructional, organizational, managerial aspects 4. social aspects of the project 5. commercial aspects of the project 6. financial aspects of the project 7. economic aspects of the project
Examination Forms	Oral presentation/essay/quizz/ Practical exam/assignments
Study and Examination Requirements	Requirements for successfully passing the module Minimum attendance at lectures is 80%, final score is evaluated based on assignments (10%), practical (20%), midterm exam (30) and final exam (40?)
Reading List	1. Gray Clive, Dkk. 1992. Introduction to Project Evaluation. Penerbit PT Gramedia Pustaka Utama. Jakarta. 2. Kartadinata, Abas. 2001. Accounting and Cost Analysis. Jakarta, Rineka Cipta 3. Hansen & Mowen. 2001. Cost Management, Indonesian Edition, Book Two, First Edition. 4. Mulyadi. 2005. Cost Accounting, Sixth Edition. Yogyakarta: STIE YKPN. 5. Supriyono. 1999. Cost Accounting, Book One, Edition two. Yogyakarta: BPFÉ. 6. Gittinger, J. Price. 1986. Economic Analysis of Agricultural Projects. Slamet Translator. 7. Husnan, S.Muhammad, S. 2000. Project Feasibility Study. Yogyakarta: UUP STIM YKPN

63	
Module designation (Code)	<b>Micro Learning(18B01C601)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Prof. Dr. Ir. H. Husain Syam, M.TP., IPU. 2. Dr. Muhammad Rais, MP., MT. 3. Ervi Novitasari, S.Pd., Gr., M.Pd. 4. Diyahwati, S.TP., M.Pd
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	Student can: 1. Understand the concept of micro learning 2. Understand the principles of micro learning 3. Understand the characteristics of micro learning 4. Understand the psychology of learning in micro learning 5. Understand the procedure for implementing micro learning 6. Understand micro learning planning 7. Understand the management system and operation of the micro teaching laboratory 8. Understand basic teaching skills 9. Practicing basic micro teaching skills
Content	1. Micro learning concept 2. Micro learning principles 3. Characteristics of micro learning 4. The concept of learning psychology in micro learning 5. Procedure for implementing micro learning 6. Develop a teaching implementation plan (RPP) 7. Management and operation of the micro teaching laboratory 8. The theory of basic micro teaching skills 9. Practice basic micro teaching skills
Examination Forms	Formative test, Summative Tests, structured task and independent task
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (20%), structured task (10%) independent task (10%), midterm exam (20%) and final exam (40%)
Reading List	1. Asril, Zaenal. 2012. Micro Teaching Disertai Dengan Pedoman Pengalaman Lapangan. Jakarta: Rajawali Pers. 2. Joko, Harun. 2014. Pedoman Praktik Pembelajaran Micro Teaching. Surakarta: FKIP-UMS. 3. Suwarna. 2006. Pengajaran Mikro. Yogyakarta: Tiara Wacana 4. Hartono, B. 2010. Pengajaran Mikro:Strategi

	<p>Pembelajaran Calon Guru-Guru Menguasai Keterampilan Dasar Mengajar. Semarang: Widya Karya.</p> <ol style="list-style-type: none"><li>5. Sardiman, 2007. Interaksi dan Motivasi Belajar Mengajar. Jakarta: PT. RajaGrafindo Persada.</li><li>6. Slameto, 2003. Belajar dan Faktor-Faktor Yang Mempengaruhinya. Jakarta : Penerbit Rineka Cipta.</li><li>7. Modul PPG Guru, 2017.</li></ol>
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64	
Module designation (Code)	<b>Experimental Design in Engineering Research(18B01C602)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Dr. Jamaluddin P, MP 2. Reski Praja Putra, S.TP., M.Si 3. Andi AlamsyahRivai, S.Pi., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	College students are expected to master the competency standards: 1. Able to understand and know the application of experimental designs, objectives and its principles 2. Able to understand analysis using one-factor variable (completely randomized design, randomized block design, and Latin square design) and comparison of mean treatment 3. Able to understand analysis using two or more factors (factorial completely randomized design, factorial randomized block design, separate plot design, separate block design) 4. Able to understand use of experimental designs with repeated observations and analysis of variance
Content	1. <b>Introduction to Experimental Design in Engineering Research:</b> general explanation scope of experimental design in engineering research 2. <b>Basic Principles of Experiment Design :</b> definition of experimental design, purpose, and basic principle of experimental designs 3. <b>Basic Principles of Experiment Design :</b> classification of experimental designs 4. <b>Completely Randomized Design (CRD) :</b> shuffle and chart experiments; linear model and total diversity breakdown; variety table structure; determination number of squares for experiments with equal and different replications; hypothesis test; SPSS application 5. <b>Randomized Block Design (RBD) :</b> shuffle and chart experiments; linear model and total diversity breakdown; variety table structure; hypothesis test; relative efficiency of RBD against CRD; SPSS application 6. <b>Comparison Middle Value :</b> hypothesis on comparison of Tuckey and LSD methods; decision making criteria; SPSS application 7. <b>Comparison Middle Value :</b> hypothesis on the comparison of Duncan methods; decision making criteria; SPSS application 8. <b>Factorial Complete Randomized Design :</b> shuffle and chart experiments; linear model and total diversity breakdown; variety table structure; hypothesis test; SPSS application

	<p>9. <b>Factorial Randomized Block Design</b> :shuffle and chart experiments; linear model and total diversity breakdown; variety table structure; hypothesis test; SPSS application</p> <p>10. <b>Latin Square Design (LSD)</b> :shuffle and chart experiments; linear model and total diversity breakdown; variety table structure; hypothesis test; relative efficiency of LSD to RBD; SPSS application</p> <p>11. <b>Split Plot Design</b> :shuffle and chart experiments; linear model and total diversity breakdown; variety table structure; hypothesis test; SPSS application</p> <p>12. <b>Split Block Design</b> :shuffle and chart experiments; linear model and total diversity breakdown; variety table structure; hypothesis test; SPSS application</p> <p>13. <b>Experimental Design with Repetitive Observation</b> :shuffle and chart experiments; linear model and total diversity breakdown; variety table structure; hypothesis test</p> <p>14. <b>Analysis of Variance</b> :shuffle and chart experiments; linear model and total diversity breakdown; variety table structure; hypothesis test</p>
Examination Forms	Essay/quizz
Study and Examination Requirements	<p>Requirements for successfully passing the module;</p> <p>Minimum attendance of lecturesis 80%</p> <p>The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)</p>
Reading List	<ol style="list-style-type: none"> <li>1. Gaspersz, Vincent. 1991. Metode Perancangan Percobaan untuk Ilmu-Ilmu Pertanian, Ilmu-Ilmu Teknik, dan Biologi. Bandung : Armico</li> <li>2. Mattjik, Ahmad Ansori., Sumertajaya I Made. 2002. Perancangan Percobaan dengan Aplikasi SAS dan Minitab, Jilid I, Edisi Kedua. Bogor : IPB Press</li> <li>3. Sugiyono. 2013. Statistika untuk Penelitian. Bandung : Alfabeta</li> <li>4. Soejanto, I. 2009. Desain Eksperimen dengan Metode Taguchi. Yogyakarta : Graha Ilmu</li> <li>5. Hubbard MR. 2003. Statistical quality Control for the Food Industry 3<sup>rd</sup> . Kluwer Academic/Plenum Publishers</li> </ol>

65	
Module designation (Code)	<b>Storage and Packaging Engineering(18B01C603)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Dr. Ir. Nur Rahmah, M.Si 2. AmiruddinHambali, S.TP., M.Si 3. ReskiFebyanti Rauf, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to master the basics of food product packaging and storage techniques; 2. Students are able to describe the processes that occur in food products due to packaging and storage treatments. 3. Students are able to describe the distribution flow of packaging and storage of food products. 4. Students are able to design packaging and labels of a food product
Content	Packaging and storage engineering courses learn about food packaging techniques including types of packaging, shape and design, use and testing of packaging, packaging rules, and labeling systems, storage techniques include storage of grains, tubers, and horticulture as well as self life of food products
Examination Forms	Oral presentation/essay/multiple choices/quizz/practical exam
Study and Examination Requirements	Requirements for successfully passing the module; Minimum attendance of boths, lectures and practicum, is 80%; Students are required to pass practicum, with a minimum score of 85.  The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)
Reading List	1. Julianti E., Mimi N. 2007. <i>TeknologiPengemasan</i> . Teknologi Pertanian Universitas Sumatera Utara 2. Hendrasty HK. 2013. <i>PengemasandanPenyimpananBahanPangan</i> . Graha Ilmu: Yogyakarta. 3. Syarief R., Armein S. 2016. <i>PengemasanPangan</i> . Penerbit Universitas Terbuka: Tangerang Selatan. 4. Coles R., McDowell D., Kirwan MJ. 2003. <i>FoodPackagingTechnology</i> . Blackwell Publishing. CRC Press. USA. 5. Rangarao GCP. 2012. <i>PlasticsinFoodPackaging</i> . Central Food Technological Research Institute, India. 6. Gross KC., Wang CY., Saltveit M. 2016. <i>The Commercial Storage of Fruits, Vegetables, and Florist and Nursery Stocks</i> . Agriculture Handbook Number 66, United States Department of

	<p>Agriculture, UC Davis, CA.</p> <ol style="list-style-type: none"><li>7. Herawati H. 2008. <i>Penentuan Umur Simpan pada Produk Pangan</i>. Jurnal Litbang Pertanian, 27(4):124-130.</li><li>8. Rahman MS. 2007. <i>Handobook of Food Preservation Second Edition</i>. CRC Press. USA.</li><li>9. Manalili NM., Dorado MA., Robert van Otterdijk. 2014. <i>Appropriate Food Packaging Solutions for Developing Countries</i>. FAO, Rome, Italy.</li></ol>
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66	
Module designation (Code)	<b>Food Analysis(18B01C604)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Dr. Andi Sukainah, STP., MSi 2. Ratnawaty Fadilah, S.TP., M.Sc 3. Reski Praja Putra, S.TP., M.Si 4. Amiruddin Hambali, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture, Lab work
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	College students are expected to master the competency standards: 1. Able to demonstrate, evaluate, discuss, and conclude about principles and methods that can be used to analyze physical properties 2. Able to demonstrate, evaluate, discuss, and conclude about principles and methods of testing the properties and characteristics of chemicals 3. Able to demonstrate, evaluate, discuss, and conclude about principles and methods of microbial testing 4. Able to demonstrate, evaluate, discuss, and conclude about principles and methods of sensory analysis of food ingredients
Content	1. <b>Introduction of Food Analysis</b> :definition of food analysis; analysis of the physical, chemical, microbiological and sensory properties of food 2. <b>Composition of Food Ingredients</b> :water content and total solid; analysis of ash, fat, protein, and carbohydrates content 3. <b>Composition of Food Ingredients</b> :vitamin and mineral analysis 4. <b>Food Microbiology Analysis</b> : how to preparation of samples; total plate count analysis 5. <b>Food Microbiology Analysis</b> :total anaerobic bacteria; total microbes based on differences optimum temperature 6. <b>Food Microbiology Analysis</b> :total microbes based on their breakdown properties at substrate; total microbes based on properties of the Gram staining 7. <b>Food Microbiology Analysis</b> :total and identification of coliform; sampling of pathogenic bacteria and identification 8. <b>Physical Properties of Food</b> :rheological principles for food analysis; heat (thermal) analysis of food; food color analysis 9. <b>Food Sensory Analysis</b> :distinction and descriptive test 10. <b>Food Sensory Analysis</b> :acceptance and consumer test 11. <b>Spectroscopy</b> : basic principles of spectroscopy; ultraviolet, visible, fluorescent, and infrared spectroscopy



	<p>12. <b>Spectroscopy</b> :atomic and emission absorption spectroscopy; mass spectroscopy</p> <p>13. <b>Chromatography</b> : basic principles of chromatography;High-PerformanceLiquid Chromatography (HPLC)</p> <p>14. <b>Chromatography</b> :Gas Chromatography (GC)</p>
Examination Forms	Oral presentation/essay/multiple choices/ quizz/practical exam
Study and Examination Requirements	<p>Requirements for successfully passing the module;</p> <p>Minimum attendance of boths, lectures and practicum, is 80% ; Students are required to pass practicum, with a minimum score of 85.</p> <p>The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)</p>
Reading List	<ol style="list-style-type: none"> <li>1. Nielsen SS. 2010. Food Analysis Laboratory Manual, 2<sup>nd</sup>. New York : Springer. (177 Halaman)</li> <li>2. Weaver CM. Daniel, JR. 2005. The Food Chemistry Laboratory : a Manual for Experimental Foods, Dietetics, and Food Scientists, 2<sup>nd</sup> . New York : CRC Press. (137 Halaman)</li> <li>3. AOAC. 1995. Official Methods of Analysis of the Association of Official Analytical Chemist. Association of Official Analytical Chemists, Washington, DC.</li> <li>4. McLandsborough, LA. Food Microbiology Laboratory. New York : CRC Press</li> <li>5. Otlis S. 2009. Handbook of Food Analysis Instruments. CRC Press</li> <li>6. Nielsen SS., 2010. Food Analysis. 4<sup>th</sup> . Springer Science+Business Media, LLC</li> <li>7. Otlis S. 2005. Methods of Analysis of Food Components and additives. Taylor &amp; Francis Group, LLC</li> <li>8. Marwaha K., 2010. Control and Analysis for Food and Agricultural Products. New Delhi : Gene Tech Books</li> </ol>

67	
Module designation (Code)	<b>Economics and Engineering Management(18B01C605)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Prof. Dr. Lahming, MS 2. Dr. Ir. Nur Rahmah, M.Si 3. Dr. Andi Sitti Halima, SP., MP
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Students can explain the Scope of Economics and Engineering Management</li> <li>2. Students can explain the principles in engineering economics</li> <li>3. Students are able to explain changes in the value of money based on different time periods</li> <li>4. Students can explain the concept of cost and economic analysis in the agricultural industry</li> <li>5. Students can explain risk management to reduce losses due to uncertainty</li> <li>6. Students can explain methods to assess the feasibility of investment plans rencana</li> <li>7. Students can use the formulas in engineering economics methods to determine the feasibility of an investment plan.</li> <li>8. Students can explain the economics of agricultural production</li> <li>9. Students can explain the types and factors that affect farming</li> <li>10. Students can apply management concepts in agribusiness economics.</li> <li>11. Students can explain industrial management and can apply the principles of agricultural industrial engineering</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. Concepts of Management;</li> <li>2. Principles of Engineering Economics and Decision Making;</li> <li>3. Risk Management;</li> <li>4. The Concept of Fees and Interests;</li> <li>5. The Concept of the Value of Money Against Time; as well as Several Economic Engineering Methods;</li> <li>6. Agricultural production economics includes Introduction; Understanding of Economic Principles and management of production systems includes farm management; factors that influence farming and the role of farmers in farm management; Economic Management in Agribusiness includes Agribusiness Economics and agribusiness management</li> </ol>
Examination Forms	Oral presentation/essay/multiple choices/ quizz/practical exam
Study and Examination Requirements	Requirements for successfully passing the module;

	<p>Minimum attendance of boths, lectures and practicum, is 80% ; Students are required to pass practicum, with a minimum score of 85.</p> <p>The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)</p>
Reading List	<ol style="list-style-type: none"> <li>1. Bungaran Saragih. 2018. Agribisnis : paradigma baru pembangunan Ekonomi berbasis pertanian</li> <li>2. Faqih. 2009. Analisis biaya, pendapatan, titik impas (bep) dan kelayakan usahatani ubijalar {ipomoea batatasl} (studi kasus di desa beringin kecamatan ciwaringin kabupaten cirebon).</li> <li>3. Gunawan (2019) Revolusi industri 4.0 untuk sektor pertanian, perkebunan dan peternakan. Penerbit Guepedia.</li> <li>4. Harjanto, Ferianto,. 2007. Ekonomi Teknik; Pengambilan Keputusan, Yogyakarta</li> <li>5. Ken Suratiyah. 2006. Ilmu Usahatani. Penebar Swadaya</li> <li>6. Muhammad Firdaus, 2007. Manajemen Agribisnis. Penerbit PT. Bumi Aksara. Jakarta</li> <li>7. Newnan, Donald G., Eschenbach, Ted G., Lavelle, Jerome P. 2004. Engineering Economic Analysis Ninth Edition, New York; University Press</li> <li>8. Rosyidi, Suherman. (2006). Pengantar Teori Ekonomi. Jakarta:PT. Raja Grafindo Persada</li> <li>9. Sri Kumalaningsih, 2014. Pohon industri potensial pada sistem agroindustri. UB Press</li> <li>10. Sujarwo. 2019. Ekonomi Produksi : teori dan aplikasi. UB Press</li> <li>11. Silvana maulidah. 2012. Pengantar manajemen Agribisnis. UB Press</li> </ol>

68	
Module designation (Code)	<b>Seminar(18B01C606)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Dr. Ir. Andi Sukainah, S.TP., M.Si 2. Amirah Mustarin, S.Pi., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	45.33 hours
Credit points	1
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to produce a thesis proposal. 2. Students are able to present a thesis proposal in the form of a seminar
Content	
Examination Forms	Seminar exam
Study and Examination Requirements	Students are required to make a thesis proposal and pass the seminar exam
Reading List	

69	
Module designation (Code)	<b>Pump and Compressor(18B01C607)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Andi Muhammad AkramMukhlis, ST., M.Si 2. Nunik Lestari, S.T.P., M.Si 3. ReskiFebyanti Rauf, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Elective for Agricultural Engineering Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit ponits	2
Required and recommended prerequisites for joining the module	Fluid Mechanics
Module objectives/intended learning outcomes	1. Students are able to master the basic principles, specifications and construction of pumps and compressors in agriculture. 2. Students are able to apply the operation and maintenance of pumps and compressors in agriculture
Cntent	1. The basic principle of the pump 2. Pump specifications 3. Pump construction 4. Pump application 5. Pump operation 6. Pump installation 7. Pump maintenance 8. Basic principle of compressor 9. Basics of gas compression 10. Classification of compressor 11. Compressor construction 12. Application of compressor 13. Installation and operation 14. Inspection and maintenance
Examination Forms	Essay/quizz/
Study and Examination Requirements	Requirements for successfully passing the module Minimum attendance at lectures is 80%, final score is evaluated based on assignments (...%), practical (...%), midterm exam (...?) and final exam (...?)
Reading List	1. Sularso, Tahara H. 2000. <i>Pompa dan Kompresor: Pemilihan, Pemakaian dan Pemeliharaan, Cetakan Ketujuh</i> . Pradnya Paramita: Jakarta. 2. Sunyoto, Karnowo, Respati B. 2008. <i>Teknik Mesin Industri</i> . Diknas: Jakarta. 3. Kutz M. 2006. <i>MechanicalEngineersHandbook: Energy and Power, Volume 4, Third Edition</i> . John Wiley and Sons, Inc. USA. 4. Gast. 2012. <i>Rotary Vane Compressors and Vacuum Pumps</i> . Gastmfg. 5. Salih, HM. 2011. <i>Fluid Machinery Third Year – Power Engineering</i> . Electromechanical Engineering Department.

70	
Module designation (Code)	<b>Power in Agriculture(18B01C608)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Prof. Dr. Lahming., MS 2. Nunik Lestari, S.T.P., M.Si 3. Andi Muhammad AkramMukhlis, ST., M.Si 4. ReskiFebyanti Rauf, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Elective for Agricultural Engineering Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit ponits	2
Required and recommended prerequisites for joining the module	-
Module onjectives/intended learning outcomes	1. Students are able to explain the concept of power in agriculture 2. Students are able to explain the types of energy resources in agriculture 3. Students are able to explain about power technology in agriculture 4. Students are able to explain about power in agriculture 5. Students are able to solve problems in case studies involving power in agriculture
Content	1. Introduction 2. The concept and understanding of power 3. Basic knowledge about motor power 4. Relationship of motor power, speed and torque 5. Internal combustion motor 6. Gasoline motor 7. Diesel motor 8. Gasoline motor ignition system 9. Fuel system on the internal combustion motor 10. Electrical system on the internal combustion motor 11. The lubrication system on the internal combustion motor 12. The cooling system on the internal combustion motor 13. Wankel motor and stirling motor 14. Dynamometer
Examination Forms	Formative test; Summative Tests; Journal Review; Project Tasks, Case Study.
Study and Examination Requirements	Requirements for successfully passing the module Minimum attendance at lectures is 80%. Final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%). Minimum final score is 61% ( "C" )
Reading List	Main: Hambali, E., Mujdalipah, S., Tambunan, A.H., Pattiwiri, A.W., dan Hendroko, R. 2007. Teknologi Bioenergi. Agromedia. Jakarta. Supporter: 1. Badan Penelitian dan Pengembangan Pertanian, Pusat Penelitian dan Pengembangan Perkebunan. 2009. Tanaman Perkebunan Penghasil Bahan

	<p>Bakar Nabati (BBN). IPB Press. Bogor.</p> <ol style="list-style-type: none"><li>2. Ramdhani, M. 2008. Rangkaian Listrik. Erlangga. Jakarta.</li><li>3. Siregar, N., 1985. Listrik Pertanian. Bahan Kuliah Jurusan Mekanisasi Pertanian. FATETA IPB. Bogor.</li><li>4. <a href="http://abe.fp.unila.ac.id/2013/09/12/daya-di-bidang-pertanian/">http://abe.fp.unila.ac.id/2013/09/12/daya-di-bidang-pertanian/</a></li></ol>
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72	
Module designation (Code)	<b>Physical and Mechanical Characteristics of Biological Material(18B01C610)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. ReskiFebyanti Rauf, S.TP., M.Si 2. Nunik Lestari, S.T.P., M.Si 3. Andi Muhammad AkramMukhlis, ST., M.Si
Language	Indonesian
Relation to curriculum	Elective for Agricultural Engineering Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit ponits	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	1. Students master the principles of characteristics of agricultural materials 2. Students master the mechanical physical characteristics of agricultural biological materials and their measurement methods 3. Students apply the application of biological mechanical physical properties of materials in the design of agricultural processing machines and processes
Content	1. Physical characteristics of agricultural products 2. The basic concepts of rheology 3. Application of rheology 4. Contact voltage 5. Impact load 6. Mechanical breakdown 7. Hydro-aerodynamic phenomena and properties 8. Friction in agricultural materials 9. Emphasis on agricultural materials 10. Agricultural material cutting 11. Agricultural product mill
Examination Forms	Essay/quizz
Study and Examination Requirements	Requirements for successfully passing the module Minimum attendance at lectures is 80%, final score is evaluated based on assignments (...%), practical (...%), midterm exam (...?) and final exam (....?)
Reading List	1. Rohadi. 2009. Sifat Fisik Bahan dan Aplikasinya dalam Industri Pangan. Semarang University Press. Semarang. 2. Cannovas B and Juliano P. 2006. Engineering Properties of Foods, in Food Engineering, [Ed. Gustavo V. Barbosa-Canovas], in Encyclopedia of Life Support Systems (EOLSS), Developed under the Auspices of the UNESCO, Eolss Publishers, Oxford, UK. 3. Sahin S and Sumnu S. G. 2002. Physical Properties of Foods. Springer. 4. Bakker-Arkema, F.W., J. DeBaerdemaeker, P. Amirante, M. Ruiz-Altiment, and C.J. Studman (1999). CIGR Handbook of Agricultural Engineering Volume IV: Agro-Processing Engineering. ASAE



	<ol style="list-style-type: none"><li>5. Hall, C.W. and D.C. Davis. 1979. Processing Equipment for Agricultural Products. The AVI Publishing Company, Inc.</li><li>6. Mohsenin, Nuri. N.1984. Electromagnetic Radiation Properties of foods and Agricultural Products. Gordon and Dreach Science Publishers. New York.</li><li>7. Mohsenin, Nuri. N.1970. Physical Properties of Plant and Animal Materials. Gordon and Dreach Science Publishers. New York.</li><li>8. Sitkei, G. 1986. Mechanics of Agricultural Materials. Elsevier.</li></ol>
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73	
Module designation (Code)	<b>Agricultural Electricity and Energy(18B01C611)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Nunik Lestari, S.T.P., M.Si 2. Andi Muhammad AkramMukhlis, ST., M.Si 3. ReskiFebyanti Rauf, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Elective for Agricultural Engineering Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit ponits	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to explain the concept of agricultural energy and electricity 2. Students are able to explain the types of energy resources in agriculture 3. Students are able to explain about bioenergy technology 4. Students are able to explain about electrical energy for agriculture 5. Students are able to solve problems in case studies involving agricultural energy and electricity.
Content	1. Introduction 2. Types of energy resources in agriculture 3. Bioenergy technology 4. Types of bioenergy 5. Basic theory of electricity 6. Current sources and electric machines 7. Electrical circuit 8. Electrical energy for agriculture 9. Case studies.
Examination Forms	Formative test; Summative Tests; Journal Review; Project Tasks, Case Study.
Study and Examination Requirements	Requirements for successfully passing the module 1. Minimum attendance at lectures is 80%. 2. Final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%). 3. Minimum final score is 61% ( "C" )
Reading List	Utama: 1. Rangkuti, P.A. 2011. Elektrifikasi Pertanian. IPB Press. Bogor. 2. Hambali, E., Mujdalipah, S., Tambunan, A.H., Pattiwiri, A.W., dan Hendroko, R. 2007. Teknologi Bioenergi. Agromedia. Jakarta. Pendukung: 1. Badan Penelitian dan Pengembangan Pertanian, Pusat Penelitian dan Pengembangan Perkebunan. 2009. Tanaman Perkebunan Penghasil Bahan Bakar Nabati (BBN). IPB Press. Bogor. 2. Ramdhani, M. 2008. Rangkaian Listrik. Erlangga. Jakarta. 3. Siregar, N., 1985. Listrik Pertanian. Bahan Kuliah Jurusan Mekanisasi Pertanian. FATETA IPB. Bogor

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Module designation (Code)	<b>Design of Agricultural Product Processing Machinery (18B01C612)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Andi Muhammad Akram Mukhlis, ST., M.Si 2. Nunik Lestari, S.T.P., M.Si 3. Reski Febyanti Rauf, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Elective for Agricultural Engineering Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	1. The student will be able to master the concepts and basic principles of agricultural product processing techniques 2. The student will be able to describe the working principles of agricultural product processing machines 3. The student will be able to design agricultural product processing machines
Content	Some aspects discussed in this course are : 1. Introduction 2. Basic Concept of Agricultural product processing techniques 3. Types and classification of processing machines and equipment 4. Machinery and agricultural product processing equipment 5. Size Reduction Machine 6. Cutting machine 7. Mixing and Forming Machine 8. Separation and Concentration machines 9. Drying machine 10. Extruder machine 11. Frying machine 12. Refrigeration machines (freezers) 13. Supporting machinery for agricultural product processing, working concepts and principles 14. Designing agricultural product processing machines
Examination Forms	Formative test; Summative Tests; Journal Review; Project Tasks, Case Study.
Study and Examination Requirements	Requirements for successfully passing the module: 1. Minimum attendance at lectures is 80%. 2. Final score is evaluated based on assignments (10%), practical (20%), midterm exam (30%) and final exam (40%). 3. Minimum final score is 61% ( "C" )
Reading List	1. Fellows, P. 2000. <i>FoodProcessing Technology, Principles and Practice, Second Edition</i> . CRC

	<p>Press, Woodhead Publishing Limited: Cambridge, UK.</p> <ol style="list-style-type: none"><li>2. Fellows, P. 2004. Small-scale Fruit and Vegetable Processing and Products. UNIDO Technology Manual: Vienna.</li><li>3. Fellows, P. 2004. Small-scale Cereal Milling and Bakery Products. UNIDO Technology Manual: Vienna.</li><li>4. Anderson, W., Martin B., Fionna C., et al. Meat Cutting and Processing for Food Service. BC Cook Articulation Committee, UK.</li><li>5. Barbut, Saih. 2015. The Science of Poultry and Meat Processing. University of Guelph: Canada.</li></ol>
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75	
Module designation (Code)	<b>Functional Food Development(18B01C613)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Dr. Andi Sukainah, STP., Msi 2. Indrayani, S.Pi., M.Biotech.Stu., Ph.D 3. Ratnawaty Fadilah, S.TP., M.Sc 4. Reski Praja Putra, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Elective for Food Technology Specialisation
Teaching methods	Lecture, Lab work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	Students are expected to master the competency standards: 1. Able to explain sources and functional properties of food, beverages, products, and their implications for health 2. Able to explain functional properties of saturated fatty acids, unsaturated fatty acids (single and plural), natural trans fatty acids, and functional properties of fat replacers. 3. Able to explain the relationship of functional properties with the immune system (innate and adaptive), as well as the role of functional properties of fiber, resistant starch, prebiotic, probiotics, and synbiotics products. 4. Able to explain antioxidant properties of nutrients and non-nutrients
Content	1. <b>Introduction to Functional Foods</b> :definition of functional food; functional food regulation; the future of functional foods 2. <b>Chlorophyll, Flavonoids, and Carotenoids</b> :source, biological activity, disease prevention of chlorophyll and chlorophyllin compounds 3. <b>Chlorophyll, Flavonoids, and Carotenoids</b> :source, biological activity, disease prevention of flavonoid and carotenoid compounds 4. <b>Functional Properties of Saturated Fatty Acids</b> :source of saturated fatty acids; biological activity and disease prevention; effect of processing on saturated fatty acids 5. <b>Functional Properties of Unsaturated and Polyunsaturated Fatty Acids</b> :source of unsaturated fatty acids; biological activity and disease prevention; effect of processing on unsaturated and polyunsaturated fatty acids 6. <b>Functional Properties of Trans Fatty Acids</b> :source of natural trans fatty acids; biological activity and disease prevention; effect of processing on trans fatty acids 7. <b>Functional Properties of Fat Replacer</b> :fat substitution ingredients; artificial fat based of proteins; artificial fat based on carbohydrates 8. <b>Humoral and Cellular Body Defense Systems</b> :humoral and cellular immune defense system 9. <b>Functional Properties of Fiber</b> :definition and

	<p>classification; influence in digestive tract; physiological effects; implications for health</p> <p>10. <b>Functional Properties of Resistant Starch</b> :classification; physiological effects; short chain fatty acids; glycemic index</p> <p>11. <b>Functional Properties of Prebiotic, Probiotic, and Synbiotic</b> :prebiotic, probiotics, synbiotics; functional properties of prebiotics, probiotics and synbiotics</p> <p>12. <b>Nutritional and Non-Nutritional Antioxidant Properties</b> :food sources and mechanism action of antioxidants; antioxidant reactions; nutrient and non nutrients antioxidant</p> <p>13. <b>Free Radical Formation and Role of The Immune System</b> : formation of free radicals in the body</p> <p>14. <b>Free Radical Formation and Role of The Immune System</b> : mechanism of immune systems against free radicals</p>
Examination Forms	Oral presentation/essay/multiple choices/quizz/practical exam
Study and Examination Requirements	<p>Requirements for successfully passing the module;</p> <p>Minimum attendance of boths, lectures and practicum, is 80%; Students are required to pass practicum, with a minimum score of 85.</p> <p>The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)</p>
Reading List	<ol style="list-style-type: none"> <li>1. Muchtadi, D. 2012. Pangan Fungsional dan Senyawa Bioaktif. Bandung : Alfabeta</li> <li>2. Guo, M. 2009. Functional Foods : Principles and Technology. New York : CRC Press</li> <li>3. Dutta PC. 2004. Phytosterols as Functional Food Components and Nutraceuticals. New York : Marcel Dekker, Inc</li> <li>4. Johnson I, G. Williamson. 2003. Phytochemical Functional Foods. New York : CRC Press</li> <li>5. Saarela M. 2011. Functional Food Concept to Product, 2<sup>nd</sup>. Philadelphia : Woodhead Publishing</li> <li>6. Shi J, G. Mazza, M. Le Maguer. 2002. Functional Foods Biochemical and Processing Aspects, Volume 2. New York : CRC Press</li> <li>7. Farnworth ER. 2008. Handbook of Fermented Functional Foods, 2<sup>nd</sup>. New York, CRC Press</li> <li>8. Charalampopoulos D., RA. Rastall. 2009. Prebiotics and Probiotics Science and Technology. Springer Science + Business Media, LLC</li> <li>9. Lee YK., S. Salminen. 2009. Handbook of Probiotics and Prebiotics, 2<sup>nd</sup> . John Wiley &amp; Sons, Inc</li> <li>10. Gibson GR., CM. Williams. 2000. Functional Foods : Concept to Product. CRC Press, Woohead Publishing Limited</li> </ol>

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Module designation (Code)	<b>Enzyme Technology(18B01C614)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Dr. Andi Sukainah, STP., Msi 2. Indrayani, S.Pi., M.Biotech.Stu., Ph.D 3. Reski Praja Putra, S.TP., M.Si 4. AmiruddinHambali, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Elective for Food Technology Specialisation
Teaching methods	Lecture, Lab work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	students are expected to master the competency standards: 1. Able to explain basics of enzymology from both, biochemical and kinetics aspects; source of enzymes and their utilization 2. Able to explain fermentation technology in producing microbial enzymes, technology for extraction, isolation, storage, and enzyme immobilization 3. Able to explain role of enzymes from animal and vegetable sources 4. Able to explain utilization of special enzymes including enzymes used in genetic engineering
Content	1. <b>Introduction to Enzyme Technology</b> :reach of industrial enzymes in era biotechnology 2. <b>Nomenclature and Classification of Enzymes</b> :nomenclature and classification of enzymes 3. <b>Biochemical Enzymes</b> :enzymes are biocatalysts; regulation of enzyme activity in cells 4. <b>Sources and Role of Enzymes from Microbes</b> :enzymes derived from microbes; thermophile enzymes 5. <b>Fermentation Technology in Enzyme Production</b> :enzyme production; nutrient needs and growth environment; enzyme-producing microbes and improving their capacity; fermentation method 6. <b>Enzyme Isolation, Storage, and Immobilization Technology</b> :extraction and separation; purification of enzymes by chromatography and electrophoresis 7. <b>Enzyme Isolation, Storage, and Immobilization Technology</b> :use of additive compounds; immobilization technology 8. <b>Source and Role of Animal Enzymes</b> :enzymes from animal source 9. <b>Source and Role of Animal Enzymes</b> :enzymesfrommarine source 10. <b>Source and Role of Enzymes from Vegetables</b> :enzymes from vegetable source 11. <b>Enzyme Kinetics</b> :measurement of enzyme reaction parameters; inhibition of enzyme reactions; effects of temperature, pH and other environmental factors

	<p>12. <b>Enzyme Kinetics</b> :enzyme reactions with two substrates; kinetics of the sigmoid enzyme</p> <p>13. <b>Biochemistry of Specific Enzymes</b> :microbial protease; glucose isomerase; alpha amylase; amyloglucosidase; pectinase</p> <p>14. <b>Enzymes Involved in Food Engineering</b> :enzymes involved in genetic engineering</p>
Examination Forms	Oral presentation/essay/multiple choices/quizz/practical exam
Study and Examination Requirements	<p>Requirements for successfully passing the module;</p> <p>Minimum attendance of boths, lectures and practicum, is 80%; Students are required to pass practicum, with a minimum score of 85.</p> <p>The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)</p>
Reading List	<ol style="list-style-type: none"> <li>1. Whitehurst RJ, M. van Oort. 2010. Enzymes in Food Technology, 2<sup>nd</sup> . Wiley-Blackwell</li> <li>2. Barredo JL. 2005. Microbial Enzymes and Biotransformations. Totowa : Humana Press</li> <li>3. Whitehurst RJ, BA. Law. 2002. Enzymes in Food Technology. New York : CRC Press</li> <li>4. Rastall R. 2007. Novel Enzyme Technology for Food Applications. New York : CRC Press</li> <li>5. Bickerstaff GF., 1997. Immobilization of Enzymes and Cells. Humana Press, Inc</li> <li>6. Whitaker JR., AGJ. Voragen, DWS. Wong. 2003. Handbook of Food Enzymology. Marcel Dekker, Inc</li> <li>7. Marangoni AG. 2003. Enzyme Kinetics : A Modern Approach. Wiley-Interscience, A John Wiley &amp; Sons, Inc</li> <li>8. Bisswnger H. 2008. Enzyme Kinetics : Principles and Methods 2<sup>nd</sup> . Wiley-VCH Verlag GmbH &amp; Co. KGaA.</li> <li>9. Bugg TDH., 2004. Introduction to Enzyme and Coenzyme Chemistry 2<sup>nd</sup>. Blackwell Publishing</li> </ol>



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Module designation (Code)	<b>New Product Processing Technology(18B01C615)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Dr. Jamaluddin P, MP 2. Indrayani, S.Pi., M.Biotech.Stu., Ph.D 3. Reski Praja Putra, S.TP., M.Si 4. Diyahwati, S.TP., M.Pd
Language	Indonesian
Relation to curriculum	Elective for Food Technology Specialisation
Teaching methods	Lecture, Lab work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	students are expected to master the competency standards: 1. Able to explain, discuss, and provide arguments about product policies, relationship between concepts and design of product, and market influence in product design 2. Able to explain, discuss, and provide arguments about needs or opportunity analysis, product planning process, and product architecture 3. Able to explain, show relationships, and provide arguments about industrial design, human element in design, and design for manufacturing.
Content	1. <b>Introduction to Product Design:</b> effect of changes on product design; product design problems 2. <b>Product Policy:</b> company strategy in product management 3. <b>Relationship between Product Concept and Product Design:</b> Identification of market; product specifications, concept generation procedures 4. <b>Market Influence in Product Design:</b> market factors, market segmentation, target market determination 5. <b>Market Influence in Product Design:</b> product positioning, consumer behavior, design influence on product 6. <b>Opportunity Analysis:</b> creative techniques, gap analysis, quality function deployment 7. <b>Opportunity Analysis:</b> SWOT analysis, triangle analysis 8. <b>Product Planning Process:</b> design characteristics, product design models, product design methods 9. <b>Product Architecture:</b> definition of product architecture; comparisons of integral and modular architectures 10. <b>Product Architecture:</b> designation of product architectures, considerations of variation and supply chain 11. <b>Industry Design:</b> history of industrial design protection, definition and scope of industrial design, industrial design protection system 12. <b>Human Element in Design:</b> designing mechanical objects by considering human elements 13. <b>Human Element in Design:</b> designing human

	<p>interactions with objects; cases</p> <p>14. <b>Design for Manufacturing (DFM):</b> DFM definition, reduce costs, consider the influence of DFM decisions, selection of appropriate assembly methods</p>
Examination Forms	Oral presentation/essay/multiple choices/quizz/practical exam
Study and Examination Requirements	<p>Requirements for successfully passing the module;</p> <p>Minimum attendance of boths, lectures and practicum, is 80%; Students are required to pass practicum, with a minimum score of 85.</p> <p>The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)</p>
Reading List	<ol style="list-style-type: none"> <li>1. Dudung A. 2012. Merancang Produk. Bandung : PT Remaja Rosdakarya</li> <li>2. Shane S. 2009. Handbook of Technology and Innovation Management. Wiley-Blackwell</li> <li>3. Winger R., G. Wall. 2006. Food Product Innovation. Food and Agriculture Organization of The United Nations</li> <li>4. Brennan JG. 2006. Food Processing Handbook. Wiley-VCH Verlag GmbH &amp; Co.KGaA</li> <li>5. Loch C., S. Kavadias. 2008. Handbook of New Product Development Management. Elsevier Ltd.</li> <li>6. Nambisan S. 2010. Information Technology and Product Development. New York : Springer</li> <li>7. Moskowitz HR., S. Porreta, M. Silcher. 2005. Concept Research in Food Product Design and Development. Blackwell Publishing</li> <li>8. Maroulis ZB., GD. Saravacos, 2003. Food Process Design. Marcel Dekker, Inc</li> <li>9. Smith J., E. Charter. 2010. Functional Food Product Development. Wiley-Blackwell, A John Wiley &amp; Sons. Ltd</li> </ol>

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Module designation (Code)	<b>Toxicology(18B01C616)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Ratnawaty Fadilah, S.TP., M.Sc 2. Indrayani, S.Pi., M.Biotech.Stu., Ph.D 3. Reski Praja Putra, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Elective for Food Technology Specialisation
Teaching methods	Lecture, Lab work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	students are expected to master the competency standards: 1. Able to explain toxicological food in terms of nutrition, non-nutrition, as well as engineering and processing aspects of food products. 2. Able to explain toxin compounds in marine products 3. Able to explain the role of immune system in food allergy and food intolerance mechanisms 4. Able to explain toxicological testing of additives and food contaminants as well as toxicological evaluations in assessing safety risks
Content	1. <b>Introduction of Nutritional and Food Toxicology</b> :definition and scope of nutrition and food toxicology 2. <b>General Principles of Toxicology</b> :toxicological effect phase; relationship between dose and response 3. <b>Factors Affecting Toxicity</b> :diet and biotransformation (effects of changes in macronutrients and micronutrients); age and gender; species 4. <b>Nutritional Toxicity</b> :macronutrients (carbohydrates, fats and protein); micronutrients (vitamins and minerals) 5. <b>Polycyclic Aromatic Hydrocarbons and Other Processing Processes</b> :benzo ( $\alpha$ ) pyrene and polycyclic aromatic hydrocarbons; nitrate, nitrite, nitrosamine; product of the Maillard reaction 6. <b>Non-nutritional Antitoxicants in Food</b> :non-nutritional antitoxicants used in food; effect of non-nutritional antitoxicants on food for the body 7. <b>Genetically Engineered Product Safety</b> :potential for GMO crops; safety of genetically modified foods; regulations regarding genetically modified foodstuffs 8. <b>Food Products that contain Estrogens and Antiestrogens</b> :lignan, zearalenone, coumestan, genistein, indol-3-carbinol and metabolites as antiestrogens 9. <b>Toxins from Fishery and Marine Products</b> :scombrotoxin; saxitoxin (paralytic shellfish poisoning); tetrodotoxin; ciguatera; blue algae

	<p>toxin (Pyropheophorbide-A)</p> <ol style="list-style-type: none"> <li>10. <b>Toxicology of the Immune System against Food Allergies and Food Intoxication</b> :basic immune system; food allergies and intoxication</li> <li>11. <b>Allergies of Seafood, Vegetable Products, Animal Products and Their Problems</b> :seafood allergy</li> <li>12. <b>Allergies of Seafood, Vegetable Products, Animal Products and Their Problems</b> :allergy to vegetable and animal products</li> <li>13. <b>Toxicological Testing of Food Additives and Contaminants</b> : additional substance which is important from toxicological point of view; indirect additives and contaminants</li> <li>14. <b>Toxicological Evaluation : Safety (Risk) Assessment</b> : acceptable daily intake; mathematical model</li> </ol>
Examination Forms	Oral presentation/essay/multiple choices/quizz/practical exam
Study and Examination Requirements	<p>Requirements for successfully passing the module;</p> <p>Minimum attendance of boths, lectures and practicum, is 80% ; Students are required to pass practicum, with a minimum score of 85.</p> <p>The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)</p>
Reading List	<ol style="list-style-type: none"> <li>1. Lu FC. 2010. Toksikologi Dasar Asas, Organ Sasaran, dan Penilaian Resiko. Nurgoho E, ZN. Bustami, I. Darmansjah, Penerjemah; Jakarta : Universitas Indonesia Press. Terjemahan dari : Basic Toxicology : Fundamentals, Target Organs, and Risk Assessment</li> <li>2. Helferich W, CK. Winter. 2001. Food Toxicology. CRC Press.</li> <li>3. Omaye ST. 2004. Food and Nutritional Toxicology. CRC Press</li> <li>4. Hodgson E., 2010. A Textbook of Modern Toxicology 4<sup>th</sup> . Wiley, a John Wiley &amp; Sons, Inc</li> <li>5. Shibamoto T., LF. Bjeldanes. 2009. Introduction Food Toxicology 2<sup>nd</sup>. Elsevier, Inc</li> <li>6. Skypala I., C. Venter. 2009. Food Hypersensitivity : Diagnosing and Managing Food Allergies and Intolerance. Wiley-Blackwell</li> <li>7. Jedrychowski L., HJ. Wichers. 2010. Chemical and Biological Properties of Food Allergens. CRC Press</li> <li>8. Manahan SE. 2003. Toxicological Chemistry and Biochemistry 3<sup>rd</sup> .CRC Press, Lewis Publishers</li> </ol>

79	
Module designation (Code)	<b>Sensory Evaluation(18B01C617)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Dr. Andi Sukainah, S.TP., M.Si 2. Ratnawaty Fadilah, S.TP., M.Sc 3. Reski Praja Putra, S.TP., M.Si 4. AmiruddinHambali, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Elective for Food Technology Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	1. Students are able to perform sensory testing and be able to distinguish types of testing in sensory evaluation 2. Students are able to work according to standardization and proper control at every stage of sensory evaluation, starting from sample preparation, response measurement, data analysis and interpretation of results
Content	This course discusses sensory testing that can be applied not only in the food industry but also in the non-food industry. In addition, this course also explains the purpose and importance of sensory analysis, sensory recognition and response measurement. Preparation for sensory evaluation starting from panelists, laboratory, and sample preparation. Types of sensory evaluation methods that are objective and subjective with case examples, data analysis and interpretation and closed with standard procedures and presentation of reports from sensory evaluations carried out
Examination Forms	Oral presentation/essay/multiple choices/quizz/practical exam
Study and Examination Requirements	Requirements for successfully passing the module; Minimum attendance of boths, lectures and practicum, is 80%; Students are required to pass practicum, with a minimum score of 85. The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)
Reading List	1. Setyaningsih, Dwi., Anton Apriyanto., dan Maya Puspita Sari. 2010. Analisis Sensori untuk Industri Pangan dan Agro. Bogor. IPB Press. 2. Kilcast D. 2010. Sensory Analysis fo Food and Beverage Quality Control a Practical Guide. New York : CRC Press

	3. Yuntis JE. 1992. The Role of Sensory Analysis in Quality Control. Philadelphia : ASTM Manual Series
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80	
Module designation (Code)	<b>Agricultural Waste Utilization Technology(18B01C618)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Dr. SubariYanto, M.Si 2. RatnawatyFadilah, S.TP., M.Sc 3. AmiruddinHambali, S.TP., M.Si 4. Diyahwati, S.TP., M.Pd
Language	Indonesian
Relation to curriculum	Elective for Food Technology Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit ponits	2
Required and recommended prerequisites for joining the module	-
Module onjectives/intended learning outcomes	Students are able to explain the concept: 1. Classification and characteristics of agricultural waste 2. types and percentage of agricultural waste 3. Composition of agricultural waste 4. Effect of agricultural waste on the environment and health 5. The role of microbes in the biodegradation of agricultural waste 6. Composting technology, POC and vermicompost 7. Utilization of agricultural waste as alternative energy for biogas, bioethanol, biofuel, biodiesel
Content	1. Introduction and overview 2. Classification and characteristics of agricultural waste 3. Kinds and types and percentage of agricultural waste 4. Composition of agricultural waste 5. Effect of agricultural waste on environment and health 6. Effect of agricultural waste on environment and health 7. The role of microbes in the biodegradation of agricultural waste 8. Compost processing technology from agricultural waste 9. Compost processing technology from agricultural waste 10. POC and vermi compost 11. Utilization of agricultural waste as alternative energy for biogas 12. Utilization of agricultural waste as an alternative energy for bioethanol 13. Utilization of agricultural waste as an alternative energy biofuel 14. Utilization of agricultural waste as an alternative energy for biodiesel
Examination Forms	Essay/quiz
Study and Examination Requirements	Requirements for successfully passing the module; Minimum attendance of boths, lectures and practicum, is 80%;The learning outcomes assessment consists of

	midterm exams (30%), final exams (40%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)
Reading List	<ol style="list-style-type: none"> <li>1. Arief Tajalli. 2015. <i>Panduan Penilaian Potensi Biomassa Sebagai Sumber Energi Alternatif Di Indonesia</i>. Penabulu Alliance</li> <li>2. Camille N. Foster. 2015 <i>Agricultural Wastes Characteristics, Types and Management</i>. Nova Pub, New York, USA</li> <li>3. Vikas Abrol and Peeyush Sharma. 2012. <i>Resource Management For Sustainable Agriculture</i> . InTech, Janeza Trdine 9, 51000 Rijeka, Croatia</li> </ol>



81	
Module designation (Code)	<b>Conservation of Water Resources (18B0IC619)</b>
Semester(s) in which the module is taught	6
Person responsible for the module	1. Dr. Ernawati Syahrudin Kaseng, S.Pi. M.Si. 2. Andi Alamsyah Rivai, S.Pi., M.Si. 3. Amirah Mustarin, S.Pi.M.Si.
Language	Bahasa
Relation to curriculum	Compulsory
Teaching methods	Lecture, field and lab works
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	1. Students can explain the meaning and principles of water conservation. 2. Students can identify the basic laws and regulations related to water conservation. 3. Students can classify materials and impacts of water pollution. 4. Students can plan water conservation activities by utilizing various technologies. 5. Students can identify various types of aquatic resources and protected aquatic ecosystems. 6. Students can understand the various types of protected aquatic ecosystems.
Content	Some aspects discussed in this course are : 1. Introduction to Aquatic Conservation 2. Water Conservation Laws and Regulations 3. Water Conservation Issues in Indonesia 4. Water Pollutants 5. Aquatic Conservation Technology 6. Protected Fisheries and Marine Resources 7. Mangrove Conservation 8. Coral Reef Conservation 9. GIS and Remote Sensing for Water Conservation 10. Research in the Field of Aquatic Conservation
Examination Forms	Formative test, Summative Test, Structured Task, Exercise, Journal Review; Project Tasks, and Case Study
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (15%), Quiz (20%) structured task (15%), midterm exam (25%) and final exam (25%)

Reading List

1. Vannucci, M. (Ed.). (2004). *Mangrove management and conservation: present and future*. Tokyo: United Nations University Press.
2. *Protecting life on earth: An Introduction to the Science of Conservation*. (2010).
3. *The Protection and Conservation of Water Resources*. (2017).
4. Díaz-delgado, R. (2017.). *The Roles of Remote Sensing in Nature Conservation: A Practical Guide and Case Studies*.
5. Finlayson, M., Arthington, A. H., & Pittock, J. (2018). *Freshwater Ecosystems in Protected Areas: Conservation and Management Edited*.
6. *Coral Reefs: Tourism, Conservation and Management Coral*. (2018).
7. *Conservation Monitoring in Freshwater Habitats: A Practical Guide and Case Studies*. (2010).
8. *How Much is an ecosystem worth? Assessing the economic value of conservation*. (2005).

82	
Module designation (Code)	<b>Ichthyology(18B01C620)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Amirah Mustarin, S.Pi. M.Si. 2. Andi Alamsyah Rivai, S.Pi.,M.Si
Language	Indonesian
Relation to curriculum	Elective for Aquatic Science Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	Students are able to know morphology, nomenclature rules, groups of fish, physiological processes, organ mechanism of action, interrelationships between organ work in fish.
Content	The scope of this course includes: the basic concepts of studying ichthyology, fish and the development of their studies, the main groups of fish, the integumentary system, the muscular system, the skeletal system, the respiratory system, the digestive system, the circulatory system, the integration system, the orogenital system and the reproductive system as well as its importance. learn animal physiology for students directly through demonstrations and practices
Examination Forms	Formative test, Summative Test, Structured Task
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (10%), practicum (20%), midterm exam (30%) and final exam (40%)
Reading List	1. Andi Iqbal Burhanuddin. 2002. Ichtiology (fish and all aspects of its development). CV. Main Budi 2. Gede Ari Yudasmarara. 2014. Fisheries Biology. Plantaxia 3. Darwin's Fishes: An Encyclopedia of Ichthyology, Ecology, and Evolution. 2004 4. The Histology of Fishes. 2019 5. Fish of the World. 2016

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Module designation (Code)	<b>Oceanography(18B01C621)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Prof. Dr. Patang, S.Pi., M.Si. 2. Dr. Subari Yanto, M.Si. 3. Andi Alamsyah Rivai, S.Pi., M.Si. 4. Marhayati, S.Pi., M.Pd.
Language	Indonesian
Relation to curriculum	Elective for Aquatic Science Specialisation
Teaching methods	Lecture, lab and field work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	Students are able to : 1. explain the basic concepts and scope of oceanography 2. explain the hypothesis of the occurrence of the ocean 3. explain the topography and sedimentation of the seabed 4. explain various physical parameters in the ocean 5. explain various chemical parameters in the ocean 6. explain various biological parameters in the ocean 7. explain the relationship between climate and oceans, and their changes
Content	Some aspects discussed in this course are : 1. Introduction to Planet "Earth" 2. Plate Tectonics and The Ocean Floor 3. Marine Provinces 4. Marine Sediments 5. Water and Seawater 6. Air-Sea Interaction 7. Ocean Circulation 8. Waves and Water Dynamics 9. Tides 10. Beaches, Shoreline Processes, and The Coastal Ocean 11. Marine Pollution 12. Marine Life and The Marine Environment 13. Biological Productivity And Energy Transfer 14. Animals of The Pelagic Environment 15. Animals of The Benthic Environment 16. The Oceans and Climate Change
Examination Forms	Formative test, Summative Test, Structured Task, Exercise, Journal Review; Project Tasks, and Case Study
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (15%), Quiz (20%) structured task (15%), midterm exam (25%) and final exam (25%)
Reading List	1. Trujillo, A. P., & Thurman, H. V. (2017). Essential of Oceanography. 2. Garrison, T., & Ellis, R. (2016). Oceanography: An Invitation to Marine Science

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Module designation (Code)	<b>Water Quality(18B01C622)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Prof. Dr. Patang, S.Pi., M.Si 2. Indrayani, S.Pi., M.Biotech.Stu., Ph.D 3. Andi AlamsyahRivai, S.Pi., M.Si
Language	Indonesian
Relation to curriculum	Elective for Aquatic Science Specialisation
Teaching methods	Lecture, field and lab work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	Aquaculture Technology
Module objectives/intended learning outcomes	Students are able to : 1. explain the meaning, objectives, criteria and planning of water quality management 2. Explain the physical parameters of water quality 3. Understand the chemical parameters of water quality 4. Understanding the biological parameters of water quality 5. Understand ways to improve water quality 6. Understanding the management of the aquaculture environment 7. Understanding the improvement of cultivation technology 8. Understanding of improving the condition of the pool 9. Understanding cultivation technology input management
Content	1. Physical Properties of Water 2. Overview of Hydrology and Water Supply 3. Review of Basic Chemistry, Solubility, and Equilibrium Chemistry 4. Dissolved Solids 5. Particulate Matter, Color, Turbidity and Light 6. Dissolved Oxygen and Other Gases 7. Redox Potential 8. pH, Carbon Dioxide, Alkalinity, Total Hardness 9. Microorganisms and Water Quality 10. Nitrogen, Phosphorus, Sulfur 11. Micro Elements and Other Residual Elements. 12. Water Pollution 13. Water Quality Regulation 14. Research in Water Quality
Examination Forms	Oral presentation/essay/multiple choices/ quizz/practical exam/assignments
Study and Examination Requirements	Requirements for successfully passing the module; Minimum attendance of boths, lectures and practicum, is 80%; Students are required to pass practicum, The learning outcomes assessment consists of midterm exams (30%), final exams (40%), assignments (10%), Practicum (20%)
Reading List	1. Boyd, C. E. (2015). <i>Water Quality: An Introduction</i> (2nd ed.). New York: Springer. 2. Asadollahfardi, G. (2015). <i>Water Quality</i>

	<i>Management Assessment and Interpretation.</i> New York: Springer.
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Module designation (Code)	<b>Information System and Personnel Management(18B01C623)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Prof. Dr. Patang, S.Pi., M.Si. 2. Dr. Subari Yanto, M.Si. 3. Andi Alamsyah Rivai, S.Pi., M.Si. 4. Marhayati, S.Pi., M.Pd.
Language	Indonesian
Relation to curriculum	Elective for Aquatic Science Specialisation
Teaching methods	Lecture, lab work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	After taking this course, students are able to: 1. Explain the importance of information management in the company 2. explain the role of managers in the management of information management 3. Explain the basis of problem solving and decision making, stages of problem solving using a systems approach and human factors that affect problem solving 4. Describe the functional organizational structure and functional information systems 5. Explain the contribution of computers make in manufacturing 6. Describe the formal procedures for collecting supplier information contributing to the fulfillment of the manufacturing schedule and achieving the desired level of quality
Content	This course discusses the definition of management and managers, management processes, skills and roles of managers, understanding of management as a science and an art, classical management theory, behavioral management theory, management science theory and the factors that influence management, both directly or indirectly as well as the impact of environmental influences on management
Examination Forms	Oral presentation/essay/multiple choices/quizz/practical exam
Study and Examination Requirements	Requirements for successfully passing the module; Minimum attendance of boths, lectures and practicum, is 80%; Students are required to pass practicum, with a minimum score of 85.  The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)
Reading List	

86	
Module designation (Code)	<b>Analysis of Potential Fishing Ground (18B01C624)</b>
Semester(s) in which the module is taught	6
Person responsible for the module	<ol style="list-style-type: none"> <li>1. Prof. Dr. Patang, S.Pi., M.Si.</li> <li>2. Dr. Subari Yanto, M.Si.</li> <li>3. Andi Alamsyah Rivai, S.Pi., M.Si.</li> <li>4. Marhayarti, S.Pi., M.Pd.</li> </ol>
Language	Bahasa
Relation to curriculum	Compulsory
Teaching methods	Lecture, field and lab works
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes <sup>5</sup>	<ol style="list-style-type: none"> <li>1. Students are able to explain the urgency of detecting and expanding fishing grounds in Indonesia</li> <li>2. Students are able to explain the formation of fishing areas using light fishing and FADs</li> <li>3. Students are able to explain the role and application of remote sensing technology in estimating fishing grounds</li> <li>4. Students are able to explain the management of fishing areas in ensuring a sustainable capture fisheries business</li> <li>5. Students are able to explain remote sensing and geographic information systems in small-scale capture fisheries management tangkap</li> <li>6. Students are able to explain conflicts over the use of resources and fishing areas</li> <li>7. Students are able to explain the impact of global warming and climate change on the distribution of fishing areas</li> </ol>



Content	<p>Some aspects discussed in this course are :</p> <ol style="list-style-type: none"> <li>1. Urgency of Detection and Expansion of Fishing Areas</li> <li>2. Light Fishing</li> <li>3. FAD Fishing</li> <li>4. The Role of Remote Sensing Technology (Sensing) in the Estimation of Fishery Oceanographic Parameters</li> <li>5. Application of Geographic Information System (GIS) and Remote Sensing Technology (Inderaja) in Estimating Fishing Areas</li> <li>6. Fishing Areas and Utilization of Fish Resources</li> <li>7. Fishing Area Management System</li> <li>8. Sustainable Catch Productivity</li> <li>9. Sustainable Fisheries</li> <li>10. Senses and GIS in Coastal Ecosystem Research</li> <li>11. Fishing Methods and Their Impact on Fishing Area Conditions</li> <li>12. Condition of Indonesian Waters and Resources</li> <li>13. Conflicts in the Use of Fishing Areas in Indonesia and Control Efforts</li> <li>14. Impact of Global Warming and Climate Change on the Distribution of Fishing Areas</li> </ol>
Examination Forms	Formative test, Summative Test, Structured Task, Exercise, Journal Review; Project Tasks, and Case Study
Study and Examination Requirements	Requirements for successfully passing the module minimum attendance at lectures is 80%, final score is evaluated based on assignments (15%), Quiz (20%) structured task (15%), midterm exam (25%) and final exam (25%)
Reading List	<ol style="list-style-type: none"> <li>1. Kevin M. Bailey, &amp; The. (2018). Fishing Lessons: Artisanal Fisheries and The Future of Our Oceans. In <i>The University of Chicago Press</i>.</li> <li>2. Nakata, K., &amp; Sugisaki, H. (2015). Impacts of the Fukushima nuclear accident on fish and fishing grounds. In <i>Impacts of the Fukushima Nuclear Accident on Fish and Fishing Grounds</i>.</li> <li>3. Simbolon, D., Irnawati, R., Sitanggang, L. P., Ernaningsih, D., Tadjuddah, M., &amp; ... (2009). Pembentukan Daerah Penangkapan Ikan. In <i>Dept PSP IPB</i>.</li> <li>4. Simbolon, D. (2019). Daerah Penangkapan Ikan: Perencanaan, Degradasi, dan Pengelolaan. In <i>IPB Press</i>.</li> </ol>

87	
Module designation (Code)	<b>Management of Fisheries Processing Industry (18B01C625)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Prof. Dr. Patang, S.Pi, M.Si 2. Dr. SubariYanto, M.Si 3. Amirah Mustarin, S.Pi. M.Si. 4. Marhayati, S.Pi.,M.Pd.
Language	Indonesian
Relation to curriculum	Elective for Aquatic Science Specialisation
Teaching methods	Lecture
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit ponits	2
Required and recommended prerequisites for joining the module	-
Module onjectives/intended learning outcomes	Students with a sense of responsibility, honesty and democracy are able to explain aspects of the management of the fishing industry as a fishery biological resource and are able to discuss the world of marine life in general based on the characteristics and principles of management of the fishing industry that govern marine financial management.
Content	1. The scope of the fisheries industry management 2. Fishing industry operations management 3. Fundamentals of operations management 4. Service operations management 5. Productivity and quality 6. Fishery human resource management 7. Fishery Industry marketing management 8. Techniques for handling and processing fishery products in industry
Examination Forms	Oral presentation/essay/multiple choices/quizz
Study and Examination Requirements	Requirements for successfully passing the module; Minimum attendance is 80%  The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)
Reading List	Putut Har Riyadi and Dian Wijayanto. 2012. Management of the fishing industry. CV. Creative sustainable media. Semarang

88	
Module designation (Code)	<b>Seaweed Processing Technology(18B01C626)</b>
Semester (s) in which the module is taught	6
Person responsible for the module	1. Indrayani, S.Pi., M.Biotech.Stu., Ph.D 2. Dr. Ir. Nur Rahmah, M.Si 3. Reski Praja Putra, S.TP., M.Si 4. Diahwati S.TP., M.Pd
Language	Indonesian
Relation to curriculum	Elective for Food Technology Specialisation
Teaching methods	Lecture, Lab work
Workload (incl. Contact hours, self-study hours)	90.66 hours
Credit points	2
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	Students are expected to master the competency standards: 1. Able to explain seaweed species and characteristics of seaweed, as well as strategic plans and implementation roles in development of seaweed 2. Able to explain the use of seaweed in conventional to modern product processing through seaweed into SCR and ATCC 3. Able to explain nutritional and bioactive components contained in seaweed and their role for health 4. Able to explain role of seaweed in development of functional food products
Content	1. <b>Introduction of Seaweed Processing Technology</b> :potential of seaweed in Indonesia; seaweed in the world 2. <b>Types and Characteristics of Seaweed</b> : types and characteristics of seaweed in Indonesia and in the world 3. <b>Seaweed Development Strategic Plan</b> :purpose and objectives of strategic plan in seaweed development; strategic plans that have been applied 4. <b>Strategy, Activities, and Implementation Role in Seaweed Development</b> :strategies and activities undertaken in seaweed development; implementationrole in development of seaweed 5. <b>Processing Seaweed into Processed Products</b> :utilization seaweed as an ingredient in manufacture of processed products 6. <b>Processing Seaweed into Processed Products</b> :seaweed product formulation 7. <b>Processing of Seaweed into SCR and ATCC</b> :processing seaweed into SCR and ATCC 8. <b>Nutritional Components in Seaweed and Their Functions for Health</b> :polysaccharides; proteins, peptides, and amino acids 9. <b>Nutritional Components in Seaweed and Their Functions for Health</b> :fats and their derivatives, vitamin, mineral 10. <b>Bioactive Components in Seaweed and Their</b>

	<p><b>Functions for Health</b> :pigment, iodine, phenol components and tannin compounds and their derivatives</p> <p>11. <b>Bioactive Components in Seaweed and Their Functions for Health</b> :halogenate compounds and unwanted compound</p> <p>12. <b>Role Seaweed in Formulation of Functional Food Product Development</b> :animal and vegetable based products</p> <p>13. <b>Role Seaweed in Formulation of Functional Food Product Development</b> :products made from mixture of animal and vegetable</p> <p>14. <b>Potential of Seaweed as Prebiotic</b> :role and function of seaweed polysaccharide components as prebiotic</p>
Examination Forms	Oral presentation/essay/multiple choices/quizz/practical exam
Study and Examination Requirements	<p>Requirements for successfully passing the module;</p> <p>Minimum attendance of boths, lectures and practicum, is 80%; Students are required to pass practicum, with a minimum score of 85.</p> <p>The learning outcomes assessment consists of midterm exams (35%), final exams (35%), structured assignments (10%), independent assignments (10%), and participation/activeness (10%)</p>
Reading List	<ol style="list-style-type: none"> <li>1. Agus sediadi, uteri Budihardjo. 2000. Rumput laut Komoditas unggulan. Penerbit Grasindo. Jakarta.</li> <li>2. Adiguna dan Agung MA., 2000, Isolasi Karagenan dari Rumput Laut. Laporan Penelitian, Fakultas Teknologi Industri, Institut Teknologi Industri, Serpong.</li> <li>3. Erliza Hambali dkk, 2006. Membuat Aneka Olahan Rumput Laut. Penebar Swadaya.Jakarta.</li> <li>4. F.G. Winarno, 1990. Teknologi Pengolahan Rumput Laut. Pustaka Sinar Harapan. Jakarta.</li> <li>5. Barrow C., F. Shahidi. 2008. Marine Nutraceuticals and Functional Foods. CRC Press</li> <li>6. Qin Y., 2018. Bioactive Seaweeds for Food Applications : Natural Ingredients for Healthy Diets. Academic Press</li> <li>7. Kim SK. 2015. Springer Handbook Of Marine Biotechnology. Springer</li> <li>8. Tiwari BK., DJ. Troy. 2015. Seaweed Sustainability Food and Non-Food Applications. Academic Press</li> <li>9. Venkatesan J., S. Anil, SK. Kim. 2017. Seaweed Polysaccharides : Isolation. Biological, and Biomedical Applications. Elsevier Inc</li> <li>10. Fleurence J., I. Levine. 2016. Seaweed in Health and Disease Prevention. Academic Press</li> <li>11. Kim SK., 2012. Handbook of Marine Macroalgae : Biotechnology and Applied Phycology. Wiley-Blackwell</li> </ol>

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Module designation (Code)	<b>Field Experience Programme(18B01C701)</b>
Semester (s) in which the module is taught	7
Person responsible for the module	1. Dr. Ir. Andi Sukainah, S.TP., M.Si 2. Amirah Mustarin, S.Pi., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Teaching Practise at a School
Workload (incl. Contact hours, self-study hours)	181.33 hours
Credit ponits	4
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Develop students' independence as teachers until they feel confident that they can take over learning activities at school</li> <li>2. class, and can prepare a sequence of learning activities.</li> <li>3. Increase students' knowledge and understanding of students, and the ability to utilize knowledge</li> <li>4. in the learning and management of learning activities</li> <li>5. To provide PPL students with the ability to develop learning models and strategies and manage learning activities to improve student learning outcomes.</li> <li>6. Provide PPL students with the ability to recognize and appreciate the value of students' individual personalities, and be responsive to differences between individuals.</li> <li>7. Develop the ability to self-assess; the ability to provide meaningful reflection on classroom experiences and actively seek solutions to problems found in learning activities.</li> <li>8. Offering PPL students insight into teacher life in schools, culture, and school organization.</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. Orientation and Field Observation</li> <li>2. Limited Teaching Skills Training</li> <li>3. Guided Teaching Training</li> <li>4. Independent Teaching Training</li> </ol>
Examination Forms	Teaching practical test
Study and Examination Requirements	Requirements for successfully passing the module; Minimum attendance in the school is 75%; Students are required to pass mikroteaching, with a minimum score of 1,66 (C).
Reading List	-

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Module designation (Code)	<b>Community Service Programme (KKN) (18B01C702)</b>
Semester (s) in which the module is taught	7
Person responsible for the module	1. Dr. Ir. Andi Sukainah, S.TP., M.Si 2. Amirah Mustarin, S.Pi., M.Si 3. RatnawatyFadilah, S.TP., M.Sc
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Practical Work in a Community
Workload (incl. Contact hours, self-study hours)	136 hours
Credit points	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Train students' ability to apply theories and scientific information that has been obtained to the public.</li> <li>2. Develop students' thoughts and insights in understanding and solving problems that develop in society in an interdisciplinary and cross-sectoral manner.</li> <li>3. Grow and mature the spirit of community service and be responsible for the development process and the future of the nation, state and religion.</li> <li>4. Providing learning experiences, developing communication competencies, and dealing directly with the community.</li> <li>5. Developing competence in empowering the community through the selection of programs implemented to improve the quality of life based on the findings of needs in the community.</li> <li>6. Develop competence in planning, implementing, and evaluating the level of success of the program being implemented.</li> <li>7. Provide the ability to make reports on the program activities that are carried out comprehensively as a form of scientific accountability for performance.</li> </ol>
Content	<p>students from various disciplines/departments, or study programs (interdisciplinary) are placed in a location or village within a certain period of time (two months). The implementation of activities per day for a maximum of 6 hours for 45 days is equivalent to 3 credits. This activity consists of :</p> <ol style="list-style-type: none"> <li>1. Briefing</li> <li>2. Observation</li> <li>3. Preparation of Work Program Design</li> <li>4. Implementation of work programs</li> </ol>
Examination Forms	Evaluation of KKN activities includes two things, namely evaluation of the academic success or achievement of KKN participants and evaluation of the overall KKN program. Evaluation is carried out by the supervisor by visiting the KKN location
Study and Examination Requirements	<p>Requirements for successfully passing the module;</p> <p>Minimum attendance in the field is 288 hours; Students are required to pass mikroteaching, with a minimum score of 1,66 (C).</p>

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Module designation (Code)	<b>Industrial Practise(18B01C703)</b>
Semester (s) in which the module is taught	7
Person responsible for the module	1. Dr. Ir. Andi Sukainah, S.TP., M.Si 2. Amirah Mustarin, S.Pi., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Practical Work in an Industri
Workload (incl. Contact hours, self-study hours)	136 hours
Credit ponits	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. Improve students' understanding of the competence of each Department in the Faculty of Engineering towards the needs of the industrial world.</li> <li>2. Raise awareness to students that in an environment full of uncertainty as it is today, flexible and dynamic plannings are needed.</li> <li>3. Provide real experience to students about the application of science and technology they have.</li> </ol>
Content	Carry out the work that has been assigned to the agency where the industrial practice supports each existing competency standard in the expertise competency of the participants.
Examination Forms	Seminar exam
Study and Examination Requirements	Students are required to make a report and pass the seminar exam
Reading List	

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Module designation (Code)	<b>Thesis(18B01C801)</b>
Semester (s) in which the module is taught	8
Person responsible for the module	1. Dr. Ir. Andi Sukainah, S.TP., M.Si 2. Amirah Mustarin, S.Pi., M.Si
Language	Indonesian
Relation to curriculum	Compulsory
Teaching methods	Research Project
Workload (incl. Contact hours, self-study hours)	181.33 hours
Credit points	4
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	Thesis is a scientific work which is the result of research that can at least confirm the results of previous research which is prepared with the ability and attitude of scientific thinking independently by students in the context of completing undergraduate studies.
Content	Research project related to their specification or education
Examination Forms	Proposal and results seminars, thesis exam
Study and Examination Requirements	Students are required to pass all seminars and thesis exam