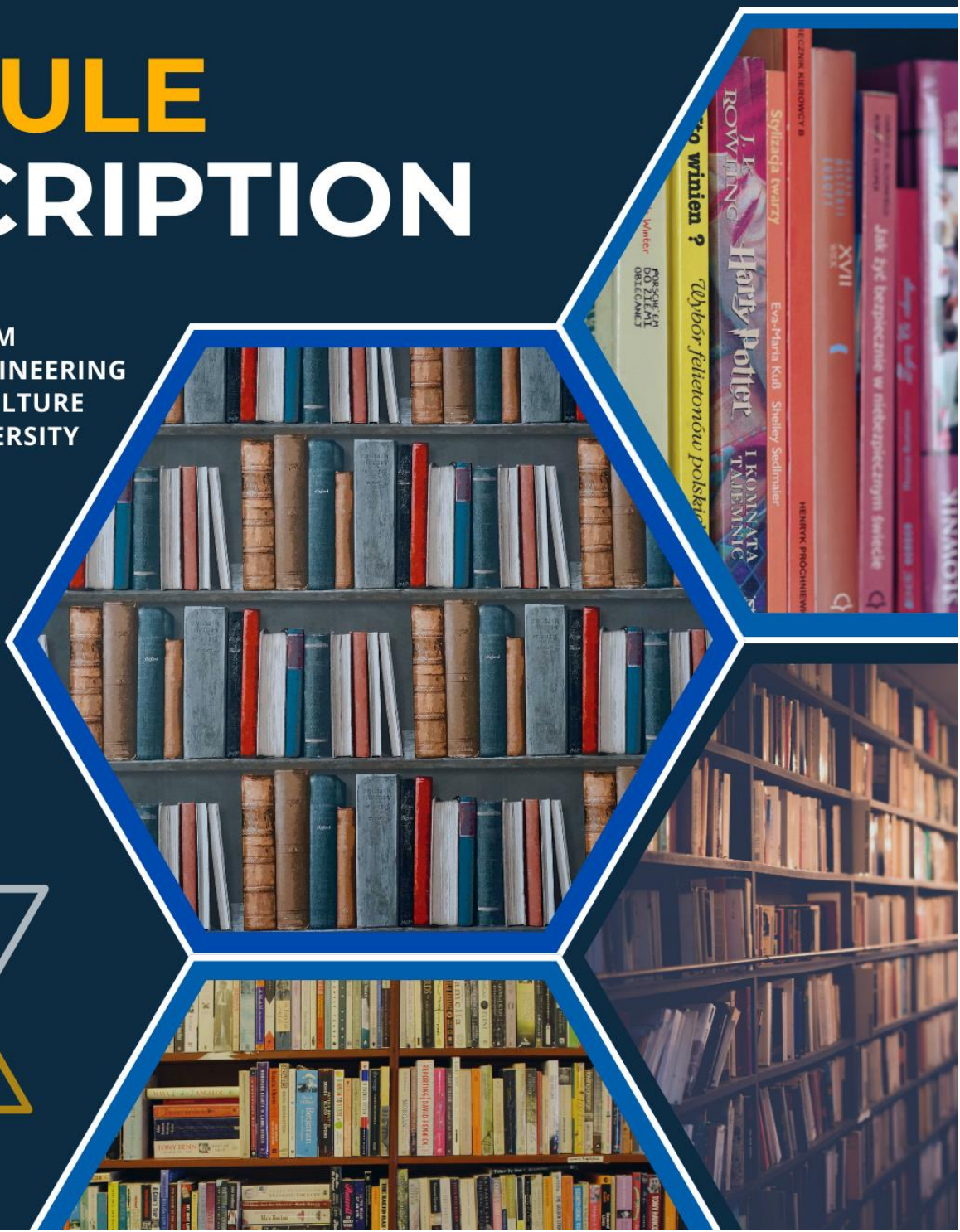
HASANUDDIN UNIVERSITY

Agricultural Engineering
Bachelor Program

2019
MODULE DESCRIPTION



BACHELOR PROGRAM
AGRICULTURAL ENGINEERING
FACULTY OF AGRICULTURE
HASANUDDIN UNIVERSITY
2019

LIST OF CONTENT

Contents

Semester 1

1. Religion Study

Module designation	*Religion Study*
Semester(s) in which the module is taught	*I*
Person responsible for the module	
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *3 SKS x 1.7 = 5.1 ECTS = 137.7 hours* *> Lecture = 35 hours* *> Excercise = 42 hours* *> Sel study = 42 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*3 SKS : 5.1 ECTS*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 7: Manage and utilize agricultural resources effectively, efficiently, and sustainably; (Competence 1)* *ILO 9: Analyze the impact of engineering solutions to the environment and society using a multidisciplinary approach; (Competence 3)*
Content	*This module delivers material about national identity, national integrity, nation and constitution, relation between nation and citizenship, democracy in Indonesia, state law and human*
Examination forms	*Study form are group project, lectures, and lessons. Examination form is written exam, project work, essay writing. During written exam, student is not allowed to use textbooks.*
Study and examination requirements	*Attendance above 80%*
Reading list	*Alquran* *Injil*

2. Civic Education

Module designation	*Civic Education*
Semester(s) in which the module is taught	*I*
Person responsible for the module	
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel Study = 28 hours* *> Exam = 4 hours (MID term and final)* *>Exam preparation= 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 7: Manage and utilize agricultural resources effectively, efficiently, and sustainably; (Competence 1)* *ILO 9: Analyze the impact of engineering solutions to the environment and society using a multidisciplinary approach; (Competence 3)*
Content	*This module delivers material about the concept of god, concept of human, concept of religon,*
Examination forms	*Study form are group project, lectures, and lessons. Examination form is written exam, project work, essay writing. During written exam, student is not allowed to use textbooks.*
Study and examination requirements	*Attendance above 80%*
Reading list	1. *Darmodiharjo, Darji. 1996. Pokok-Pokok Filsafat Hukum. Gramedia Pustaka Utama: Jakarta.* 2. *Armawi, armaidy.2005. Geostrategic Indonesia. Makalah disampaikan pada Kursus Calon Dosen Pendidikan Kewarganegaraan yang diselenggarakan oeh Depdiknas Dirjen Dikti di Jakarta pada tanggal 12-23 Desember 2005.* 3. *Basri, Chaidir. 2005. Pengetahuan Politik dan Strategi. Makalah disapaikan pada kursus Calon Dosen Pendidikan Kewarganegaraan yang diselenggarakan oleh Depdiknas Dirjen Dikti di Jakarta pada tanggal 12-13 Desember 2005.* 4. *Darmodiharjo, Darji. 1996. Pokok-pokok Filsafat Hukum. Gramedia Pustaka Utama: Jakarta.* 5. *Kaelan. 2005. Filsafat Pancasila sebagai filsafat bangsa dan Negara Indonesia. Makalah disampaikan pada Kusus Calon dosen Pendidikan Kewarganegaraan yang diselenggarakan oleh*

3. Maritime Culture Study

Module designation	*Maritime Culture Study*
Semester(s) in which the module is taught	*I*
Person responsible for the module	*Muhammad Neil*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel Study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation= 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 7: Manage and utilize agricultural resources effectively, efficiently, and sustainably; (Competence 1)* *ILO 9: Analyze the impact of engineering solutions to the environment and society using a multidisciplinary approach; (Competence 3)*
Content	*This module delivers material about matime continent, potency and resources of maritime, demography fact, and Indonesian maritime history, principle concept of social and cultural system, maritime society, maritime culture, and development of maritime continent.*
Examination forms	
Study and examination requirements	*Study form are group project, lectures, and lessons. Examination form is written exam, project work, essay writing. During written exam, student is not allowed to use textbooks.*

Reading list	1. *Benua Maritim Indonesia (Direktorat Teknologi Inventarisasi Sumberdaya Alam, BPPT Teknologi, 1996). Jakarta: BPPT TEKNOLOGI – WANHANKAMNAS.* 2. *Kerangka Kebijakan Pengembangan Pola Ilmiah Pokok (Tim Penyusun: Radi A.Gani Dkk,1999). Universitas Hasanuddin Makassar.* 3. *Pembangunan Kelautan Indonesia: Perspektif Kemandirian Lokal (Mappadjantji Dkk,1999). Makalah disampaikan pada Seminar Nasional Pembangunan Kelautan Indonesia, diselenggarakan oleh BKS PTN INTIM bekerjasama dengan DPK, 20-21 Desember 1999 di PKP* 4. *Maritime Trade and State Development in Early Southeast Asia (Kenneth R.Hall, 1985). University of Hawaii Press, Honolulu.* 5. *Upaya Memahami Kebudayaan Maritim (Mukhlis Paeni, 1994). Makalah disumbangkan dalam Lokakarya Mata Kuliah Dasar Umum B Fakultas Sastra Unhas.* 6. *Strategi-strategi Adaptif yang Digunakan Nelayan Madura Dalam Kehidupan Ekonomi Perikanan Lautnya (Munsi Lampe, 1989. Tesis. Program Studi Antropologi, Fak. Pascasarjana Universitas Indonesia, Jakarta.* 7. *Editorial Introduction (Rob van Ginkel dan J.Verrips,1988). Dalam Maritime Anthropological Studies, Vol.1 No.1: 1-2).*

4. English

Module designation	*English*
Semester(s) in which the module is taught	*I*
Person responsible for the module	*Sudarmin Harun*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel Study = 28 hours* *> Exam = 4 hours (MID term and final)* *>Exam preparation= 8.5 hours*
Credit points	*Lecturer assessment: attendance-10%, assignment-30%, presentation 30%, examination 30%.*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*1. Capable to make decision strategic in food science and technology based on scientific data and information.* *2. Capable to communicate scientific knowledge effectively orally as well as written*
Content	*Teaching time: lecture-10 hrs, examination-2 hrs, presentation-12 hrs. Sub total: 24 hrs. Student's self study time: preparation of self study report -1 hrs, preparation for tests and examination-1 hrs, preparation for seminars-2 hrs, additional time (individual questions to lecturers after the class) -1 hrs. Sub total: 5 hrs.*
Examination forms	
Study and examination requirements	*Study form are group project, lectures, and lessons. Examination form is written exam,*
Reading list	*Handbook of english study skill for fresh man adobted from more reading power by Beatrice*

5. Elementary Mathematics

Module designation	*Elementary Mathematics*
Semester(s) in which the module is taught	*I*
Person responsible for the module	*Nur Erawaty*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel Study = 28 hours* *> Exam = 4 hours (MID term and final)* *>Exam preparation= 8.5 hours*
Credit points	*Lecturer assessment: attendance-10%, assignment-30%, presentation 30%, examination 30%.*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*1. Having a comprehensive understanding on the theoretical concept and principle of food science and technology in a broad sense (humanity, basic, and applied science) to support their expertise in food science and technology.* *2. Capable to make decision strategic in food science and technology based on scientific data and information.*
Content	*This module delivers material about real number system, function and draft, limit and continuety, function derivates, derivate application, integral and its application.*
Examination forms	
Study and examination requirements	*Study form are group project, lectures, and lessons. Examination form is written exam, project work, essay writing. During written exam, student is not allowed to use textbooks.*
Reading list	*Dale Varberg, Edwin Purcell, dan Steve Rigdon, 2011, Calculus 9th edition*

6. Elementary Chemistry

Module designation	*Elementary Chemistry*
Semester(s) in which the module is taught	*I*
Person responsible for the module	*Syahruddin Kasim*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel Study = 28 hours* *> Exam = 4 hours (MID term and final)* *>Exam preparation= 8.5 hours*
Credit points	*Lecturer assessment: attendance-10%, laboratory report 50%, examination 40%.*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*1. Having a comprehensive understanding on the theoretical concept and principle of food science and technology in a broad sense (humanity, basic, and applied science) to support their expertise in food science and technology.* *2. Be able to perform food chemical and physical analysis in supporting food quality control, and food for special health purposes.*
Content	*This module delivers material about atomic stucture, table periodic of chemistry, chemistry bound, solution, chemistry and acid - base equilibrum, thermodynamic in chemistry, chemical kinetics, hydrocarbon, functional group, acid-base organic and its derivates, basic of biomolecular.*
Examination forms	
Study and examination requirements	*Study form are group project, laboratory sessions, lectures, and lessons. Examination form is written exam, project work, laboratory session or essay writing. During written exam, student is not allowed to use textbooks. During laboratory session, a student must available logbook and showed written report of practical experiments of what has been taught in lecture or*
Reading list	*Handbook Basic Chemistry, Tim Dosen Chemistry UPT MKU Universitas Hasanuddin, 2012*

7. Introduction to Agricultural Technology

Module designation	*Introduction to Agricultural Technology*
Semester(s) in which the module is taught	*I*
Person responsible for the module	*Prof. Dr. Ir. Salengke, M.Sc.* *Prof. Dr. Ir. Amran Laga, M.S.*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS : 3.4 ECTS*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*ILO 2: demonstrate capacity for life-long learning in agricultural engineering profession; (Attitude 2)* *ILO 6: manage and utilize agricultural resources effectively, efficiently, and sustainably; (Skill 2)*
Content	*This course provides to introduce and provide students with an understanding of fields and topics in agricultural technology.*
Examination forms	*Write Exam*
Study and examination requirements	*Attendence above 80%*
Reading list	*Materials for lectures are taken from various sources*

8. Scientific Writing for Engineering

Module designation	*Scientific Writing for Engineering*
Semester(s) in which the module is taught	*I*
Person responsible for the module	*Diyah Yumeina, S.TP, M.Agr, Ph.D*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*lecture*
Workload (incl. contact hours, self-study hours)	*2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*• ELO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields.* *• ELO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession*
Content	*This course will produce students' competence in conducting agricultural engineering research and presenting it in scientific forums. Students are able to understand the basics of research methods and implement them through research in the field. After taking this course, students are able to compile articles from the results of field research that are disseminated at the national and international levels.*
Examination forms	*Writing and essay, etc.*
Study and examination requirements	*Attendance Above 80%*
Reading list	*1. Nana Sudjana 2013. Tuntunan Penyusunan Karya Ilmiah: Makalah, Skripsi, Thesis, Disertasi . Cetakan Keempatbelas. Bandung: Sinar Baru Algensindo* *2. Riswandha Imawan, 1996. Metodologi Penelitian. Pasca Sarjana UNTAG. Surabaya* 3. *Totok Djuroto dan Bambang Suprijadi, 2013, Menulis Artikel dan Karya Ilmiah. Cetakan Keenam. Bandung: Remaja Rosdakarya.*

9. Engineering Drawing

Module designation	*Engineering Drawing*
Semester(s) in which the module is taught	*I*
Person responsible for the module	*Dr. Iqbal, STP., M.Si* *Dr. Ir. Daniel Useng, M.Eng.Sc* *Dr. Abdul Azis, STP., M.Si* *Samsuar, STP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture, Excercise.*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Basic Mathematics*
Module objectives/intended learning outcomes	*ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 6: Design simple equipment, components, or processes needed in agricultural engineering operations; (Skill 2)*
Content	*This course provides one of the skills required in engineering practice. Students are expected to understand various types of technical drawings and be able to sketch details of agricultural machinery. This course teaches about drawing tools and materials, methods of pictorial and orthogonal drawing, projections and geometric constructions. The course also covers drawing standards, tolerance systems in materials, composition of drawings, and detailed drawings. This course also presents material about drawing techniques using software, which includes 2-dimensional and 3-dimensional drawings.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	1. *G. Takeshi Sato dan N. Sugiarto Hartanto, 2005. Menggambar Mesin Menurut Standar ISO. Pradnya Paramita, Jakarta* 2. *Cilin H. Simmons and Dennis E. Maguire, 2004. Manual of Engineering Drawing. Elsevier Newnes.* 3. *David A. Madsen and David P. Madsen, 2012. Engineering Drawing and Design, Fifth Edition. Delmar, USA.*

10. Engineering Drawing Practicum

Module designation	*Engineering Drawing Practicum*
Semester(s) in which the module is taught	*I*
Person responsible for the module	*Dr. Iqbal, STP., M.Si* *Dr. Ir. Daniel Useng, M.Eng.Sc* *Dr. Abdul Azis, STP., M.Si* *Samsuar, STP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lab works*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS = 1.7 ECTS = 45.9 hours (1 ECTS around 27 hours)* *> Laboratory session = 12 hours* *> Lab report = 30 hours* *> Virtual experiment = 1 hours* *> Final examination = 2.5 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 6: manage and utilize agricultural resources effectively, efficiently, and sustainably; (Skill 2)*
Content	*1. Students make a technical drawing in agriculture in accordance with ISO standards* *2. [Students have the skills to make various types of technical drawings in the field of agriculture* *3. Students are able to make a drawing* *4. design of agricultural tools and machinery*
Examination forms	*Drawing, Writing and Simulation*
Study and examination requirements	*Completion of all laboratory project*
Reading list	*1. G. Takeshi Sato dan N. Sugiarto Hartanto, 2005. Menggambar Mesin Menurut Standar ISO. Pradnya Paramita, Jakarta* *2. Cilin H. Simmons and Dennis E. Maguire, 2004. Manual of Engineering Drawing. Elsevier Newnes.* *3. David A. Madsen and David P. Madsen, 2012. Engineering Drawing and Design, Fifth Edition. Delmar, USA.*

Semester 2

1. Pancasila Education

Module designation	*Pancasila Education*
Semester(s) in which the module is taught	*II*
Person responsible for the module	*1. Esan Lamban,* *2. Subair*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel Study = 28 hours* *> Exam = 4 hours (MID term and final)* *>Exam preparation= 8.5 hours*
Credit points	*Lecturer assessment: attendance-10%, assignment-30%, presentation 30%, examination 30%.*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*1. Being a good citizen who respects the diversity based on Indonesian national ideology* *2. Capable to communicate scientific knowledge effectively orally as well as written*
Content	*This module dilievers material about Pancasila in Indonesian history, Pancasila is a basic nation, Pancasila is ideology of Indonesia nation, Pancasila is a phylosophy system, Pancasila is ethic system, Pancasila as basic value in science development.*
Examination forms	
Study and examination requirements	*Study form are group project, lectures, and lessons. Examination form is written exam, project work, laboratory session or essay writing. During written exam, student is not allowed to use textbooks.*
Reading list	*1. Agus Wahyudi, Ideologi Pancasila, Doktrin Komprehensif atau Konsepsi Politis? Typescript[bisa diakses dalam http://filsafat.ugm.ac.id/aw]* *2. Kaelan, Filsafat Pancasila, Paradigma, Yogyakarta, 1996, (terutama Bab 1-4)* *3. Oetojo Oesman dan Alfian (eds), ''Pendahuluan'' dalam Pancasila sebagai Ideologi Dalam Kehidupan Bermasyarakat, Berbangsa dan Bernegara, BP7 Pusat, Jakarta, 1990, pp. 1-39* *4. Hardono Hadi, Hakikat dan Muatan Filsafat Pancasila, Kanisius, Yogyakarta, 1994 (Bab 1 & 2)*

2. Indonesia Language

Module designation	*Indonesia Language*
Semester(s) in which the module is taught	*II*
Person responsible for the module	*Hasan*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel Study = 28 hours* *> Exam = 4 hours (MID term and final)* *>Exam preparation= 8.5 hours*
Credit points	*Lecturer assessment: attendance-10%, assignment-30%, presentation 30%, examination 30%.*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*1. Being a good citizen who respects the diversity based on Indonesian national ideology* *2. Capable to communicate scientific knowledge effectively orally as well as written*
Content	*This module dilievers material about history and function of bahasa, criteria of moral presentation, standard indonesian spelling, preparing scientific work.*
Examination forms	
Study and examination requirements	*Study form are group project, lectures, and lessons. Examination form is written exam, project work, laboratory session or essay writing. During written exam, student is not allowed to use textbooks.*
Reading list	*1. Chaer, Abdul. 2007. Kajian Bahasa. Jakarta: Rineka Cipta* *2. Mahsun. 2007. Metode Penelitian Bahasa. Jakarta: Raja Grafindo Perkasa* *3. Djajasudarma, T. Fatimah. 2006. Wacana Pemahaman dan Hubungan Antarunsur. Bandung: Rafika Aditama* *4. Grice, Paul. 1975. Logic and Conversation. New York: Academic Press.* *5. Leech, Geoffrey. 1983. Principle of Pragmatics. London: Longman*

3. Physics

Module designation	*Physics*
Semester(s) in which the module is taught	*II*
Person responsible for the module	*1. Nur Hasana* *2. Maria*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel Study = 28 hours* *> Exam = 4 hours (MID term and final)* *>Exam preparation= 8.5 hours*
Credit points	*Lecturer assessment: assignment 10%, Presentation 50%, Laboratory work 20%, examination*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*1. Having a comprehensive understanding on the theoretical concept and principle of food science and technology in a broad sense (humanity, basic, and applied science) to support their expertise in food science and technology.* *2. Capable to make decision strategic in food science and technology based on scientific data and information.*
Content	*This module delivers material about kinematic and dynamic of objects, work and energy, fluid, elasticity, heat and temperature, coloumb law and electric field, electrical current and circuits, wave and fibration, optics and its tools, modern physics.*
Examination forms	
Study and examination requirements	*Study form are group project, laboratory sessions, lectures, and lessons. Examination form is written exam, project work, laboratory session or essay writing. During written exam, student is not allowed to use textbooks. During laboratory session, a student must available logbook and showed written report of practical experiments of what has been taught in lecture or*
Reading list	*Handbook of Basic of Physics. TIM Dosen Universitas Hasanuddin 2017*

4. Biology

Module designation	*Biology*
Semester(s) in which the module is taught	*II*
Person responsible for the module	*Ambeng*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel Study = 28 hours* *> Exam = 4 hours (MID term and final)* *>Exam preparation= 8.5 hours*
Credit points	*Lecturer assessment: assignment 10%, Presentation 50%, Laboratory work 20%, examination*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*1. Having a comprehensive understanding on the theoretical concept and principle of food science and technology in a broad sense (humanity, basic, and applied science) to support their expertise in food science and technology.* *2. Be able to identify microorganism in foodstuff and processed food including applying in biotechnology.*
Content	*Concept of biologgy basic unit of life, virus, cell, metabolism (catabolism and anabolism), cell division and inheritance, plan reproduction system, animal reproduction system, coordination system (plan and animal), homeostasis, ecology, evolution, classification of living beings, basic biotechnology.*
Examination forms	
Study and examination requirements	*Study form are group project, laboratory sessions, lectures, and lessons. Examination form is written exam, project work, laboratory session or essay writing. During written exam, student is not allowed to use textbooks. During laboratory session, a student must available logbook and showed written report of practical experiments of what has been taught in lecture or what has been done in laboratory.*
Reading list	*1. Barrett, J.M. 1986. BIOLOGY. Prentice-Hall, Englewood Cliffs, New Jersey* *2. Campbell, N.A., Reece, J.B., Urry, L.A., Cain, M.L., Wasserman, S.A., Minorsky, P.V., Jackson, R.B. 2010., Biology. Edisi kedelapan Jilid 1. Erlangga, Jakarta.* *3. Campbell, N.A., Reece, J.B., Urry, L.A., Cain, M.L., Wasserman, S.A., Minorsky, P.V., Jackson,* *4. R.B. 2010., Biology. Edisi kedelapan Jilid 2. Erlangga, Jakarta.* *5. Campbell, N.A., Reece, J.B., Urry, L.A., Cain, M.L., Wasserman, S.A., Minorsky, P.V., Jackson,* *6. R.B. 2010., Biology. Edisi kedelapan Jilid 3. Erlangga, Jakarta.* *7. Nurcahyo, H. 2011. Diktat Bioteknologi. Jurusan Pendidikan Biologi Fakultas Matematika dan*

5. English for Engineers

Module designation	*English for Engineers*
Semester(s) in which the module is taught	*II*
Person responsible for the module	*Prof. Dr. Ir. Salengke, M.Sc.* *Dr. Ir. Daniel, M.Eng.Sc*
Language	*English*
Relation to curriculum	*Compulsory*
Teaching methods	*Lectures* *Individual and Group Assignments* *TOEFl and IELTS Simulation*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*English*
Module objectives/intended learning outcomes	*ILO 2: apply knowledge of mathematics, sciences, and engineering principles in agricultural fields;*
Content	*This course is directed to improve the ability of Agricultural Engineering students in reading, listening, writing and speaking, focusing on engineering and agricultural topics. This course is structured at various levels of proficiency integrating the skills necessary to improve students' English and vocabulary. Vocabulary in the field of agricultural engineering. The learning process consists of individual and group activities that are relevant, informative, entertaining and engaging. Student achievement is monitored through weekly quizzes and scheduled exams.*
Examination forms	*Writing and Oral exam*
Study and examination requirements	*Attendance above 80%*
Reading list	*1. Ibbotson, Mark. 2010. Cambridge English for Engineering with Audio* *2. Philips, D, 2001. Longman Complete course for the TOEFL Test.* *3. ETS 2012. Official guide to the TOEFL Test, 4rth ed. iBT*

6. Engineering Mathematics I

Module designation	*Engineering Mathematics I*
Semester(s) in which the module is taught	*II*
Person responsible for the module	*Dr. Ir. Sitti Nur Faridah, MP.* *Dr. Ir. Mahmud, MP.* *Dr. Suhardi, STP., MP.* *Dr. Gemala Hardinasinta, S.TP.*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture and in-depth discussion*
Workload (incl. contact hours, self-study hours)	*Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Basic mathematics*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 6: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)*
Content	*This course is designed to develop and expand students' critical thinking skills by implementing strategies that will help them interpret, analyze, evaluate, conclude, and synthesize the concepts learned in this course and develop greater knowledge and understanding of mathematics and to achieve skills that necessary for success in studies (Mathematical Engineering II).*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*Stroud, K.A., 1987. Engineering Mathematics, 3-ed. The Macmillan Press, Ltd*

7. Engineering Mathematics I Practicum

Module designation	*Engineering Mathematics I Practicum*
Semester(s) in which the module is taught	*II*
Person responsible for the module	*Muhammad Tahir Sapsal, STP., M.Si* *Samsuar, STP., M.Si* *Husnul Mubarak, S.TP., M.Si* *Dr. Gemala Hardinasinta, S.TP*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Tutorial*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS x 1.7 = 1.7 ECTS = 45.9 hours* *> Lecture = 11.6 hours* *> Excercise = 14 hours* *> Sel study = 14 hours* *> Exam = 2 hours (MID term and final)* *> Exam preparation = 4.3 hours*
Credit points	*1 SKS =1.7 ECTS*
Required and recommended prerequisites for joining the module	*Elementary Mathematics*
Module objectives/intended learning outcomes	*ILO 3 : apply knowledge of mathematics, sciences, and engineering principles in agricultural fields;* *ILO 4 : use quantitative analysis, information technology and critical thinking in agricultural engineering profession;* *ILO 6 : manage and utilize agricultural resources effectively, efficiently, and sustainably;*
Content	*This course is designed to develop and expand students' critical thinking skills by implementing strategies that will help them interpret, analyze, evaluate, conclude, and synthesize the concepts learned in this course and develop greater knowledge and understanding of mathematics and to achieve skills that necessary for success in studies (Mathematical Engineering II).*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*Stroud, K.A., 1987. Engineering Mathematics, 3-ed. The Macmillan Press, Ltd.*

8. Applied Statistics

Module designation	*Applied Statistics*
Semester(s) in which the module is taught	*II*
Person responsible for the module	*Dr. Ir. Supratomo, DEA* *Prof. Dr. Ir. Mursalim* *Prof. Dr. Ir. Junaedi Muhidong, M.Sc* *Diyah Yumeina RD, STP., M.Agr., Ph.D*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Exercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Basic Mathematics*
Module objectives/intended learning outcomes	*Use quantitative analysis, information technology and critical thinking in agricultural engineering profession;*
Content	*This course will introduce students to the concepts of data presentation, processing data (frequency distribution, histogram and cumulative distribution function), estimation theory, hypothesis testing, ANOVA, correlation and regression, and non-parametric statistics.*
Examination forms	*Writing exam*
Study and examination requirements	*At least 80% attendance for students to be able to take the exam*
Reading list	*1. Asep Saifuddin, Khairil Anwar Notodipuro, Aam Alamudi dan Kusman Sadik. 2009. Statistika Dasar. Basic Statistics. PT. Grasindo, Jakarta.* *2. Johnson, Robert and Patricia Kuby. 2008. Elementary Statistics 10th Ed. Thomson Brooks/Cole, Belmont, CA.* *3. Walpole, R. E. and Raymond H. Myers. 2007. Probability and Statistics for Engineers and Scientists 8th ed. Pearson Prentice Hall. London. (Terjemahan: Pengantar Statistika edisi ke-3. 1993. PT. Gramedia Pustaka Utama, Jakarta.).*

9. Engineering Profesional Ethics

Module designation	*Engineering Professional Ethics*
Semester(s) in which the module is taught	*II*
Person responsible for the module	*Prof. Dr. Ir. Ahmad Munir, M.Eng* *Prof. Dr. Ir. Mursalim*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS = 1.7 ECTS = 45.9 hours (1 ECTS around 27 hours)* *> Laboratory session = 12 hours* *> Lab report = 30 hours* *> Virtual experiment = 1 hours* *> Final examination = 2.5 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 6: manage and utilize agricultural resources effectively, efficiently, and sustainably;*
Content	*This course provides a conceptual framework that encourages engineers to reflect on how they can best realize the benefits of the application of their skills. In order to do so they need to allow time and effort to assess their immediate professional tasks in a broader human context. One of the reasons for the previous and current lack of such engagement is undoubtedly that the technical core of engineering is intellectually a very demanding activity. The content of learning are: Definition of ethics and engineering, Engineers as a Profession, Issue in ethical engineer, Traditional ethical viewpoints, Ethics in other professions, Reflection, Aspirational Engineering Ethics, and Practical Outcomes in Engineering Education, Institutions, Industry and Work Practices, Positioning Engineering in the Public and Intellectual Mainstreams, Aspirational Role for Engineering in International Political Initiatives and in Ethical Ethos Across Cultures*
Examination forms	*Writing and oral exam*
Study and examination requirements	*Attendance above 80%*
Reading list	*Bowen, WR., 2009. Engineering Ethics. Outline of An Aspirational Approach. Springer, London*

10. Engineering Propertise of Materials

Module designation	*Engineering Properties of Materials*
Semester(s) in which the module is taught	*II*
Person responsible for the module	*Prof. Dr. Ir. Salengke, M.Sc.* *Prof. Dr. Ir. Junaedi Muhidong, M.Sc.* *Prof. Dr. Ir. Mursalim* *Dr. Ir. Abdul Waris, MT*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* • *Lecture = 23.3 hours* • *Excercise = 28 hours* • *Sel study = 28 hours* • *Exam = 4 hours (MID term and final)* • *Exam preparation = 8.5 hours*
Credit points	*2 SKS =3.4 ECTS*
Required and recommended prerequisites for joining the module	*Basic Physics* *Basic Chemistry*
Module objectives/intended learning outcomes	*ILO 3 : Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 7 : Manage and utilise agricultural resources effectively, efficiently, and sustainably; (Competence 1)*
Content	*This course equips students with knowledge about various physical properties of food materials and biological substances required in designing processes and equipment for handling and processing agricultural products, as well as controlling processing procedures. Topics taught in this course include thermal properties, rheological properties, aerodynamic properties, optical properties, electrical properties, thermodynamic properties, texture and mechanical properties, and flow properties of grain products. Measurement methods and analysis of these properties are also introduced.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	1. *Ignacio Arana: Physical Properties of Foods: Novel Measurement Techniques and Applications. ISBN: 978-1-4398-3537-1 (eBook - PDF).* 2. *Jiri Blahovec and Miroslav Kutilek: Physical methods in agriculture: Approach to precision and quality. ISBN: 978-1-4615-0085-8 (eBook)* 3. *Gyorgy Sitkei: Mechanics of Agricultural Materials. ISBN: 0-444-99523-4.*

Semester 3

1. Introduction to Agronomy

Module designation	*Introduction to Agronomy*
Semester(s) in which the module is taught	*I*
Person responsible for the module	*Prof. Dr. Ir. Elkawakib Syam'un, MP.* *Prof. Dr. Ir. Kaimuddin, M.Si.* *Prof. Dr. Ir. Muh. Farid BDR, MP.* *Dr. Ir. Amir Yassi, M.Si.* *Dr. Ir. Katriani Mantja, MP.* *Prof. Ir. Rinaldi Sjahril, M.Agr., PhD.*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture, Lab Works*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *3 SKS x 1.7 = 5.1 ECTS = 137.7 hours* *> Lecture = 35 hours* *> Excercise = 42 hours* *> Sel study = 42 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*3 SKS : 5.1 ECTS*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 7: Manage and utilize agricultural resources effectively, efficiently, and sustainably; (Competence 1)*
Content	*This course covers the basic understanding and scope of agronomy, agricultural systems in Indonesia, plants and environmental factors, plant growth phases, efforts to increase production and inhibiting factors, modern and conventional plant propagation, land and environmental management, cultivation techniques and biotechnology in agriculture.*
Examination forms	*Write Exam*
Study and examination requirements	*Attendence above 80% and Completion of all laboratory practicum*

Reading list	1. *Endress, R. 1994. Plant cell Biotechnology. Spinger-Verlag. Berlin. Heidelberg. New York.* 2. *Gardner, F.P., R.B. Pearce, dan R.L. Mitchell. 1985. Physiology of Crop Plants. The Iowa State University Press, Anes, Iowa.* 3. *Hartman, H.T. and D. E. Kester. 1983. Plant Principles and Practices. Prentice-Hall, Inc.* 4. *Hay, R.K.M., A.J. Walker. 1992. An introduction to the physiology of crop yield. Longman Scientific & Technical England.* 5. *Harjadi, S.S. 2002. Pengantar Agronomi. PT Gramedia Pustaka Utama. Jakarta.* 6. *Jumin, H.B. 2005. Dasar-Dasar Agronomi. PT raja Grafindo Persada. Jakarta.* 7. *Lakitan, B. 1996. Fisiologi pertumbuhan dan perkembangan tanaman. PT. RajaGrafindo Persada Jakarta.* 8. *Nasir. 2001. Bioteknologi Pertanian. Penerbit PT. Grafindo Jakarta.* 9. *Sennang, N.R., dkk. 2013. Pengantar Agronomi. Heksa Utama. Makassar.* 10. *Sri Setyati H. 1989. Pengantar Agronomi. PT. Gramedia Jakarta.* 11. *Sutanto, R. 2002. Penerapan Pertanian Organik. Pemasyarakatan dan Pengembangan. Penerbit Kanisius Yogyakarta* 12. *Syamsu Sadjad. 1984. Dasar-dasar Agronomi, Departemen Agronomi Fakultas Pertanian IPB.*

2. Fundamental of Soil Science

Module designation	*Fundamental of Soil Science*
Semester(s) in which the module is taught	*I*
Person responsible for the module	*Prof. Dr. Ir. Hazairin Zubair, M.S.* *Prof. Dr.Ir. Dorothea Agnes Rampisela, M.Sc.* *Dr. Ir. Muh. Jayadi, M.P* *Dr. Ir. Burhanuddin Rasyid, M.Sc* *Ir. Masyhur Syafiuddin, M.P.* *Dr. Rismaneswati, S.P., M.P.* *Dr. Asmita Ahmad, ST. M.Si.* *Dr. Sartika Laban, SP., MP.* *Nirmala Juita, SP.,M.Si* *Ahmad Fauzan Adzima, SP.,M.Sc* *Risky Nurhikmayani, S.Si.,M.Sc*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture, Lab Works*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *3 SKS x 1.7 = 5.1 ECTS = 137.7 hours* *> Lecture = 35 hours* *> Excercise = 42 hours* *> Sel study = 42 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*3 SKS : 5.1 ECTS*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 7: Manage and utilize agricultural resources effectively, efficiently, and sustainably; (Competence 1)* *ILO 9: Analyze the impact of engineering solutions to the environment and society using a multidisciplinary approach; (Competence 3)*
Content	*This course aims to provide an understanding of the process of soil formation and soil building blocks; the physical, chemical and biological properties of soil for the benefit of plant growth and production, the life of other organisms and for sustainable land use.*
Examination forms	*Write Exam*
Study and examination requirements	*Attendence above 80% and Completion of all laboratory practicum*
Reading list	1. *Brady, N. C. 1990. The Nature and Properties of Soils. MacMillan Publishing Company. New York.* 2. *Foth, H.D. 1990. Fundamentals of Soil Science. 8th ed. John Wiley & Sons. New York.* 3. *Weil, R.R. and Brady, N.C. 2017. The Nature and Properties of Soils. 15th ed. Pearson. Boston.* 4. *White, R.E. 2006. Principles and Practice of Soil Science. Fourth Edition. Blackwell Publishing. USA.*

3. Engineering Mathematics II

Module designation	*Engineering Mathematics II*
Semester(s) in which the module is taught	*III*
Person responsible for the module	*Dr. Ir. Mahmud Achmad, MP* *Dr. Ir. Sitti Nur Faridah, MP* *Ir. Helmi A. Koto, M.Si* *Dr. Suhardi, STP., MP*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture, tutorial, independent assigment*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS =3.4 ECTS*
Required and recommended prerequisites for joining the module	*Basic Mathematics* *Engineering Mathematics I*
Module objectives/intended learning outcomes	*ILO 3 : Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields* *ILO 4 : Use quantitative analysis, information technology and critical thinking in agricultural engineering profession* *ILO 6 : Manage and utilize agricultural resources effectively, efficiently, and sustainably*
Content	*Capability to utilize mathematical principles in natural phenomena and process related to Agricultural engineering. Built/formulate and solve mathematical models of natural process in agricultural engineering field using differential linear equation. This course covers: mathematical equations concept, general form of differential equations, solutions of differential equations first and second order, application of linear differential equations, Laplace transformation and its application to solve differential equations, Lagrange-multipliers, series, and vector analysis.*
Examination forms	*Writing and Lab Works*
Study and examination requirements	*Completation of all laboratory reports*
Reading list	*Engineering Mathematics 4th Edition by K.A. Stroud, Dexter & Booth*

4. Fluid Mechanics

Module designation	*Fluid Mechanics*
Semester(s) in which the module is taught	*III*
Person responsible for the module	*Prof. Dr. Ir. Ahmad Munir, M.Eng* *Dr. Ir. Mahmud Achmad, MP* *Dr. Ir. Sitti Nur Faridah, MP* *Dr. Suhardi, STP., MP*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture* *Practice* *Independent assignment*
Workload (incl. contact hours, self-study hours)	*2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Physics*
Module objectives/intended learning outcomes	*ILO 3 : apply knowledge of mathematics, sciences, and engineering principles in agricultural fields;* *ILO 4 : use quantitative analysis, information technology and critical thinking in agricultural engineering profession;* *ILO 5 : use techniques, skills, and modern tools necessary for agricultural engineering practices;* *ILO 6 : anage and utilize agricultural resources effectively, efficiently, and sustainably*
Content	*The student will be able to demonstrate the understanding of processes and phenomena in fluid statics and dynamics in both flows in pipe and open channel. This course covers concept and fluid characteristics, control volume (Bernoulli's Law) and energy balance in fluid, flow in pipe: energy and pressure of water in pipe using Moody, flow in open channel: uniform and non-uniform flow, hydraulic jump, gradually and rapid flow.*
Examination forms	*Writing and essay, etc.*
Study and examination requirements	*Attendance Above 80%*
Reading list	*Gerhart, PM. & RJ. Gross, 1985. Fundamentals of Fluid Mechanics, Addison Wesley Pub. Co., California*

5. Thermodynamics

Module designation	*Thermodynamics*

Semester(s) in which the module is taught	*III*
Person responsible for the module	*Prof. Dr. Ir. Mursalim.* *Prof. Dr. Ir. Junaedi Muhidong, M.Sc.* *Prof. Dr. Ir. Salengke, M.Sc.*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel Study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation= 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Physics*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 6: Design simple equipment, components, or processes needed in agricultural engineering operations; (Skill 2)*
Content	*Topics that will be studied include the concept of energy, work, energy transfer, the first law of thermodynamics, properties of pure substances, P-V-T relationship, ideal gas, conservation of mass and energy, the second law of thermodynamics, Carnot cycle, and entropy.*
Examination forms	*Writing exam*
Study and examination requirements	*Attendance above 80%*
Reading list	*Yunus A. Cengel and Michael A. Boles (2005): Thermodynamics: An Engineering Approach*

6. Introduction to Climatology

Module designation	*Introduction to Climatology*
Semester(s) in which the module is taught	*III*
Person responsible for the module	*Dr. Ir. Mahmud Achmad, MP* *Dr. Ir. Daniel Useng, M.Eng.Sc* *Dr. Suhardi, STP., MP* *Samsuar, STP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS =3.4 ECTS*
Required and recommended prerequisites for joining the module	*Basic Mathematics* *Fundamental Physics*
Module objectives/intended learning outcomes	*ILO 7 : Manage and utilize agricultural resources effectively, efficiently, and sustainably; (Competence 1)* *ILO 8 : Demonstrate capacity in operating agricultural engineering related business either as producer or service provider; (Competence 2)*
Content	*Student will be able to demonstrate global understanding of climate, its components and be able to classify climate. This course explain climate in global, Characteristics of climate. Explain component of climate including process, measurement related parameter for precipitation, evaporation, transpiration, Temperature of soil and atmosphere, Radiation and Atmospheric Moisture and Atmospheric Pressure. Climatic classification of a region Using Schmith-Fergusson, Koppen dan Oldeman Classification Methods.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*Robert V. Rohli & Anthony J. Vega, 2018. Climatology 4th Edition. Jones & Bartlett Learning, USA*

7. Surveying

Module designation	*Surveying*
Semester(s) in which the module is taught	*III*
Person responsible for the module	*Prof. Dr. Ir. Ahmad Munir,M.Eng.* *Dr. Ir. Daniel Useng,M.Eng.Sc.* *Dr. Ir. Mahmud, MP.* *Haerani, STP.,M.Eng.Sc.*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS= 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Physics*
Module objectives/intended learning outcomes	*ILO 5 : Use techniques, skills, and modern tools necessary for agricultural engineering practices;(skill 1).* *ILO 7 : Manage and utilize agricultural resources effectively, efficiently, and sustainably; (competence 1).*
Content	*This course contains (1) basic concepts of surveying, (2) Measurement, Calculation, and Corrections in Distance and Angle, (3) Mensuration in Polygon (Area, Volume, and Cut & Fill) (4) Digital Mapping System (SIG and remote Sensing).*
Examination forms	*Writing exam*
Study and examination requirements	*Attendance above 80%*
Reading list	*Schofield, W. & M. Breach, 2007. Engineering Surveying. Sixth Edition, Butterworth-Heinemann Elsevier. Sydney.*

8. Heat Transfer

Module designation	*Heat Transfer*
Semester(s) in which the module is taught	*III*
Person responsible for the module	*Prof. Dr. Ir. Junaedi Muhidong, M.Sc.* *Prof. Dr. Ir. Salengke, M.Sc* *Dr.rer.nat. Olly Sanny Hutabarat, STP.,M.Si.*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture and in-depth discussion*
Workload (incl. contact hours, self-study hours)	*Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Engineering Properties of Materials*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 7: Manage and utilise agricultural resources effectively, efficiently, and sustainably; (Competence 1)*
Content	*This course will provide student with knowledge on the modes of heat transfer and skills on solving heat related engineering problems. The topics covered in this course include modes of heat transfer, conduction in onedimension, convective heat transfer, natural and forced convective heat transfer, radiation heat transfer, and heat exchangers.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*1. Çengel, Y. A. 1998. Heat Transfer: A Practical Approach. McGraw Hill, Inc. Hightstown, N.J.* *2. Holman, J. P. 2010. Heat Transfer 10th ed. McGraw-Hill. New York*

9. Instrumentation

Module designation	*Instrumentation*
Semester(s) in which the module is taught	*III*
Person responsible for the module	*Dr. Ir. Abdul Waris, MT* *Dr. Abdul Azis, STP., M.Si* *Muhammad Tahir Sapsal, STP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lab works*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 6: manage and utilize agricultural resources effectively, efficiently, and sustainably; (Skill 2)*
Content	*1. The definition and scope.* *2. Explain units of measurement and measurement error measurement.* *3. Explain the working principle of various electrical sensors electrical sensors.* *4. Explain the static and dynamic characteristics of electrical sensors characteristics.* *5. o analyze various methods of converting physical quantities to analog electrical quantities.* *6. Design a converter for converting sensor data into analog voltage in the form of analog voltage.* *7. To master the concept of amplification and be able to design a sensor data amplifier* *8. Convert analog data to digital data by creating a conversion program (ADC) on a computer,* *9. Converting digital data to actual data measurement data by creating a mathematical program (polynomial and linear).* *10. Explain the concept of converting digital data to actual measurement data using a computer system. actual measurement data by using an expert system and fuzzy logic* *11. Designing the construction of measuring instruments (analog and digital) that are commonly used in the field of Engineering*
Examination forms	*Writing and oral exam*
Study and examination requirements	*Attendence above 80%*
Reading list	*1. Doebelin, Ernest O., 1990, Measuremnet system, Aplicatiaon dan design, fourth editian, McGraw-Hill International edition.*

	2. *Yan J., Ryan, M. dan Power, J. 1994. Using Fuzzy Logic, Prentice - Hall International, Inc* 3. *Budiharto, W. 2008. Panduan Praktikum Mikrokontroler AVR Atmega16. Elex Media Komputindo Kelempok Gramedia, Jakarta.* 4. *William Siler and James J. Buckley, 2005. Fuzzy-Expert ystems-and-Fuzzy-Reasoning. Published by John Wiley & Sons, Inc., Hoboken, New Jersey.*

10. Engineering Mathematics Tutorial II

Module designation	*Engineering Mathematics Tutorial II*
Semester(s) in which the module is taught	*III*
Person responsible for the module	*Dr. Ir. Mahmud Achmad, MP* *Dr. Ir. Sitti Nur Faridah, MP* *Ir. Helmi A. Koto, M.Si* *Dr. Suhardi, STP., MP*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Writing and Lab Works*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS x 1.7 = 1.7 ECTS = 45.9 hours* *> Lecture = 11.6 hours* *> Excercise = 14 hours* *> Sel study = 14 hours* *> Exam = 2 hours (MID term and final)* *> Exam preparation = 4.3 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Basic Mathematics* *Engineering Mathematics I*
Module objectives/intended learning outcomes	*ILO 3: apply knowledge of mathematics, sciences, and engineering principles in agricultural fields;* *ILO 4: use quantitative analysis, information technology and critical thinking in agricultural engineering profession;* *ILO 6: manage and utilize agricultural resources effectively, efficiently, and sustainably;*
Content	*Capability to utilize mathematical principles in natural phenomena and process related to Agricultural engineering. Built/formulate and solve mathematical models of natural process in agricultural engineering field using differential linear equation. This course covers: mathematical equations concept, general form of differential equations, solutions of differential equations first and second order, application of linear differential equations, Laplace transformation and its application to solve differential equations, Lagrange-multipliers, series, and vector analysis.*
Examination forms	*Writing and Lab Works*
Study and examination requirements	*Completation of all laboratory reports*
Reading list	*Engineering Mathematics 4th Edition by K.A. Stroud, Dexter & Booth*

11. Fluid Mechanics Practicum

Module designation	*Fluid Mechanics Practicum*
Semester(s) in which the module is taught	*III*
Person responsible for the module	*Prof. Dr. Ir. Ahmad Munir, M.Eng* *Dr. Ir. Mahmud Achmad, MP* *Dr. Ir. Sitti Nur Faridah, MP* *Dr. Suhardi, STP., MP*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lab Works*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS x 1.7 = 1.7 ECTS = 45.9 hours* *> Lecture = 11.6 hours* *> Excercise = 14 hours* *> Sel study = 14 hours* *> Exam = 2 hours (MID term and final)* *> Exam preparation = 4.3 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Fluid Mechanics*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 6: Design simple equipment, components, or processes needed in agricultural engineering operations; (Skill 2)*
Content	*The student will be able to demonstrate the understanding of processes and phenomena in fluid statics and dynamics in both flows in pipe and open channel. This course covers concept and fluid characteristics, control volume (Bernoulli's Law) and energy balance in fluid, flow in pipe: energy and pressure of water in pipe using Moody, flow in open channel: uniform and non-uniform flow, hydraulic jump, gradually and rapid flow.*
Examination forms	*Writing and oral exam*
Study and examination requirements	*Attendance above 80% and completed report*
Reading list	*Gerhart, PM. & RJ. Gross, 1985. Fundamentals of Fluid Mechanics, Addison Wesley Pub. Co., California*

12. Surveying Practicum

Module designation	*Surveying Practicum*
Semester(s) in which the module is taught	*III*
Person responsible for the module	*Muhammad Rizal, STP., M.Si* *Husnul Mubarak, S.TP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Practices in Laboratory*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS x 1.7 = 1.7 ECTS = 45.9 hours* *> Lecture = 11.6 hours* *> Excercise = 14 hours* *> Sel study = 14 hours* *> Exam = 2 hours (MID term and final)* *> Exam preparation = 4.3 hours*
Credit points	*1 SKS =1.7 ECTS*
Required and recommended prerequisites for joining the module	*Measurement Tools in Surveying* *Elementary Mathematics*
Module objectives/intended learning outcomes	*ILO 3 : apply knowledge of mathematics, sciences, and engineering principles in agricultural fields;* *ILO 5 : use techniques, skills, and modern tools necessary for agricultural engineering practices;* *ILO 6 : manage and utilize agricultural resources effectively, efficiently, and sustainably;*
Content	*Student will be able to measure, calculate, and correct the distances (horizontal profile), and angle (polygon). They also have skill to draw contour and calculate cut and fill as well as the digital mapping in GIS and remote sensing. This course contains (1) basic concepts of surveying, (2) Measurement, Calculation, and Corrections in Distance and Angle, (3) Mensuration in Polygon (Area, Volume, and Cut & Fill) (4) Digital Mapping System (SIG and remote Sensing).*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*Schofield, W. & M. Breach, 2007. Engineering Surveying. Sixth Edition, Butterworth-Heinemann Elsevier. Sydney.*

13. Instrumentation Practicum

Module designation	*Instrumentation Practicum*
Semester(s) in which the module is taught	*III*
Person responsible for the module	*Muhammad Tahir Sapsal, STP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lab works*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS = 1.7 ECTS = 45.9 hours (1 ECTS around 27 hours)* *> Laboratory session = 12 hours* *> Lab report = 30 hours* *> Virtual experiment = 1 hours* *> Final examination = 2.5 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Physics*
Module objectives/intended learning outcomes	*ELO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields.* *ELO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession.* *ELO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices.* *ILO 6: manage and utilize agricultural resources effectively, efficiently, and sustainably; (Skill 2)*
Content	*This course provides the knowledge and skills needed to design simple control and instrumentation systems. Topics covered are instrumentation systems, types of electrical sensors, techniques of converting physical data from sensors to voltage, filters, current and voltage amplification with Op-Amp ICs, design of data loggers with microcontrollers, and application of expert systems and fuzzy logic to improve precision in instrumentation systems. Translated with www.DeepL.com/Translator (free version)*
Examination forms	*Writing and essay, etc.*
Study and examination requirements	*Attendance Above 80%*
Reading list	*1. Budiharto, W. 2008. Panduan Praktikum Mikrokontroler AVR Atmega16. Elex Media Komputindo Kelempok Gramedia, Jakarta.* *2. Doebelin, Ernest O., 1990, Measuremnet system, Aplicatiaon dan design, fourth editian, McGraw-Hill International edition.*

Semester 4

1. Research Methodology

Module designation	*Research Methodology*
Semester(s) in which the module is taught	*IV*
Person responsible for the module	*Prof. Dr. Ir. Junaedi Muhidong, M.Sc* *Dr. Iqbal, STP., M.Si* *Ir. Helmi A. Koto, M.Si* *Diyah Yumeina RD, STP., M.Agr., Ph.D*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	*ILO 2: demonstrate capacity for life-long learning in agricultural engineering profession.* *ILO 4: use quantitative analysis, information technology and critical thinking in agricultural engineering profession* *ILO 9: analyze the impact of engineering solutions to the environment and society using a multidisciplinary approach;* *ILO 10: explore and develop effective solutions related to agricultural engineering issues.*
Content	*This subject aims to introduce the concept of and scientific research theory to students and to equip students with the ability in conducting scientific research. Topics to be Discussed in this course including Identification research problems, formulation of hypothesis questions and research, literature review, Data collection techniques, data analysis (parametric and non- statistical analysis parametrics), and report writing.*
Examination forms	*Writing and oral exam*
Study and examination requirements	*Attendance above 80%*

Reading list	1. *Nana Sudjana 2013. Guidelines for the Preparation of Scientific Work: Papers, Thesis, Thesis, Dissertation. Fourteenth Printing. Bandung: Sinar Baru Algensindo* 2. *Riswandha Imawan, 1996. Research Methodology. Post Graduate UNTAG. Surabaya* 3. *Totok Djuroto and Bambang Suprijadi, 2013, Writing Articles and Scientific Works. Sixth Printing. Bandung: Teen Rosdakarya.*

2. Engineering Mechanics

Module designation	*Engineering Mechanics*
Semester(s) in which the module is taught	*IV*
Person responsible for the module	*Dr. Ir. Sitti Nur Faridah, MP* *Dr. Iqbal, STP., M.Si* *Dr. Abdul Azis, STP., M.Si* *Samsuar, STP., M.S*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS =3.4 ECTS*
Required and recommended prerequisites for joining the module	*Basic Mathematics* *Basic Physics* *Engineering Mathematics I* *Engineering Mathematics II* *Fluid Mechanics*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 7: Manage and utilise agricultural resources effectively, efficiently, and sustainably; (Competence 1)*
Content	*This course covers the principles of mechanical engineering, namely statics and dynamics, which form the foundation for designing agricultural tools and machinery. This course covers topics such as: dimensions and units, the International System of Units, rigid body statics, equilibrium concepts, center of mass and centroid, moment of inertia, kinematics of linear motion, dynamic principles, momentum and impulse, work and energy, kinematics of curved motion, projectile motion, and rotational kinematics.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*1. Tmoshenko, S and D.H. Young. Engineering Mechanics. Erlangga ,1990* *2. Ferdinand P. B; E.R. Jahuston and Liong, T.H. Mechanics for Engineers: Statics. 1976*

3. Mechanical Workshop

Module designation	*Mechanical Workshop*
Semester(s) in which the module is taught	*IV*
Person responsible for the module	*Dr. Iqbal, S.TP., M.Si* *Dr. Ir. Daniel Useng, M.Eng.Sc* *Dr. Abdul Azis, STP., M.Si* *Samsuar, STP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture and disscusion, independent assigment, practicum*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Engineering Properties of Materials*
Module objectives/intended learning outcomes	*ILO 3 : Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields* *ILO 5: Use techniques, skills, and modem tools necessary for agricultural engineering practices.* *ILO 7 : Design simple equipment, components, or processes needed in agricultural engineering operations*
Content	*This course provides an opportunity for students to recognize and understand the agricultural workshop management system and introduction to workmanship techniques in the workshop. Coverage of the materialconsists of an introduction to equipment and work materials (wood and metal) as well as skills in (wood and metal) and skills in using basic equipment and welding both electric and both electric and carburetor welding and an introduction to piping, pneumatic and hydraulic systems piping, pneumatic and hydraulic systems*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*1. Herren, R.V.; E.L. Cooper. 2000. Agricultural Mechanics, Fundamentals and Application, CENGAGE Delmar Learning* *2. F. Nicholson. 1955. Shop Theory. Mc GrawHills* *3. Anonymous 2008. Careers in focus: Mechanics. 3rd ed. Infobase pub. USA*

4. Agricultural Product Processing Technology I

Module designation	*Agricultural Product Processing Technology I*
Semester(s) in which the module is taught	*IV*
Person responsible for the module	*Prof. Dr. Ir. Mursalim* *Diyah Yumeina, STP.,M.Agr.,Ph.D.*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Engineering Mathematics I* *Engineering Properties of Materials* *Heat Transfer and Thermodynamics*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 7: Manage and utilise agricultural resources effectively, efficiently, and sustainably; (Competence 1)*
Content	*This course provides to introduce and provide students with an understanding of post-harvest and processing aspects of agricultural and plantation products. This course will contribute to the achievement of Graduate Learning Outcomes #3, #4, #5, and #7.*
Examination forms	*Writing exam*
Study and examination requirements	*Attendence above 80%*
Reading list	*1. Agricultural Process Engineering* *2. CIGR Handbook Volume 4: Agro-Processing Engineering* *3. Solar Drying Technology* *4. Handbook of coffee Processing* *5. Coffee Planting, Production, and Processing* *6. Chocolate, Cocoa, and Confectionery* *7. An Introduction to rice grain technology* 8. *Postharvest Handling: A Systems Approach*

5. Farm Electrification

Module designation	*Farm Electrification*
Semester(s) in which the module is taught	*IV*
Person responsible for the module	*Dr. Ir. Abdul Waris, MT* *Dr. Abdul Azis, STP., M.Si* *Muhammad Tahir Sapsal, STP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel Study = 28 hours* *> Exam = 4 hours (MID term and final)* *>Exam preparation= 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Physics*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)*
Content	*This course introduces students to electrical codes and electrical codes and rules and discusses the transmission of low voltage (220 V and 380 V), AC and DC sources, DC, AC 1 and 3 phase circuits, testing procedures, methods of calculation of electrical power demand and power correction factor power, electrical installation methods, load distribution (electric heating, electric motors, lighting). , electric motors, lighting). This course includes laboratory practice for AC 1 and 3 phases for electric motors, lighting and lamps.*
Examination forms	*Writing exam*
Study and examination requirements	*Attendance above 80%*
Reading list	1. *Bovay, H.E 1981. Handbook of Mechanical and Electrical Systems for Buildings. McGraw-Hill Book Company* 2. *Lister, E.C. 1980. Electric Circuits and Machine. McGraw-Hill Book Company.* 3. *Mullin, R.C and R.L. Smith, 1992. Electrical Wiring Commercial. Sixth Edition. Delmar Publishing Inc.* 4. *Seidman, A.H., H. Mahrous, and T.G. Hicks 1983. Handbook of Electric Power Calcularions. McGraw- Hill Book Company.* 5. *Turner, W.C. 1982. Energy Management Handbook. Jonh Wiley & Son. New York.*

6. Engineering Design

Module designation	*Engineering Design*
Semester(s) in which the module is taught	*IV*
Person responsible for the module	*Dr. Ir. Abdul Waris, MT* *Dr. Iqbal, STP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*1. Engineering Mechanics* *2. Engineering Materials Knowledge* *3. Engineering Drawing* *4. Engineering Drawing Practicum*
Module objectives/intended learning outcomes	*ELO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields.* *ELO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession* *ELO 5: Use techniques, skills, and modem tools necessary for agricultural engineering practices.*
Content	*The course is designed to provide students with knowledge and skills in engineering design which they can apply in designing simple agricultural tools and equipment. This course discusses concepts, principles and procedures in engineering design and basic calculations for dimensions of machine element.*
Examination forms	*Writing and essay, etc.*
Study and examination requirements	*Attendance Above 80%*
Reading list	*Harsokoesoemo, H.D., 2004, Pengantar PerancanganTeknik (Perancangan Produk), Bandung, ITB press*

7. Engineering Hydrology

Module designation	*Engineering Hydrology*
Semester(s) in which the module is taught	*IV*
Person responsible for the module	*Prof. Dr. Ir. Ahmad Munir,M.Eng.* *Dr. Suhardi, STP., MP.* *Dr. Ir. Mahmud, MP.* *Samsuar, STP., MSi*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Fluid Mechanics*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 6: Design simple equipment, components, or processes needed in agricultural engineering operations; (Skill 2)*
Content	*This course covers: (1) concept of Hydrological Cycle, (2) Data Processing of precipitation, interception, evaporation, surface and subsurface flow, infiltration and percolation, and groundwater, (3) Statistical hydrology and (4) Rainfall- runoff Modeling.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	1. *Linsley Jr., RK., MA Kohler, JLH. Paulhus, 1982. Hydrology for Engineers. Third Edition. McGraw-Hill Inc., New York.* 2. *Asdak, C., 2004. Hydrologi dan Pengelolaan Daerah Aliran Sungai. Gadjah Mada University Press, Yogyakarta.*

8. Farm Power & Machinery

Module designation	*Farm Power & Machinery*
Semester(s) in which the module is taught	*IV*
Person responsible for the module	*Dr. Iqbal, STP., M.Si* *Dr. Abdul Azis, STP., M.Si* *Muhammad Tahir Sapsal, STP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture, Excercise.*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 6: Design simple equipment, components, or processes needed in agricultural engineering operations; (Skill 2)* *ILO 8: Demonstrate capacity in operating agricultural engineering related business either as producer or service provider; (Competence 2)*
Content	*This course is designed to enable students to understand the use of power in agriculture, types of motors and engines, and agricultural tools and machinery. The course covers the working principles of internal combustion and electric motors, electrical systems, cooling and lubrication systems, ignition systems, power transmission, and an introduction to 2-wheel and 4-wheel tractors*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*Principles of Farm Machinery; Tractors and Their Power Unit*

9. Agricultural Product Processing Technology II

Module designation	*Agricultural Product Processing Technology II*
Semester(s) in which the module is taught	*VI*
Person responsible for the module	*Dr. Ir. Supratomo, DEA* *Prof. Dr. Ir. Salengke, M.Sc* *Prof. Dr. Ir. Mursalim*
Language	*Indonesia*
Relation to curriculum	*Elective*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS =3.4 ECTS*
Required and recommended prerequisites for joining the module	*Food Processing Engineering* *Heat Transfer and Thermodynamics*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 7: Manage and utilise agricultural resources effectively, efficiently, and sustainably; (Competence 1)*
Content	*This course covers the principles of mechanical engineering, namely statics and dynamics, which form the foundation for designing agricultural tools and machinery. This course covers topics such as: dimensions and units, the International System of Units, rigid body statics, equilibrium concepts, center of mass and centroid, moment of inertia, kinematics of linear motion, dynamic principles, momentum and impulse, work and energy, kinematics of curved motion, projectile motion, and rotational kinematics.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*1. Tmoshenko, S and D.H. Young. Engineering Mechanics. Erlangga ,1990* *2. Ferdinand P. B; E.R. Jahuston and Liong, T.H. Mechanics for Engineers: Statics. 1976*

10. Mechanical Workshop Practicum

Module designation	*Mechanical Workshop Praticum*
Semester(s) in which the module is taught	*IV*
Person responsible for the module	*Dr. Iqbal, STP., M.Si* *Samsuar, STP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Writing and Lab Works*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS x 1.7 = 1.7 ECTS = 45.9 hours* *> Lecture = 11.6 hours* *> Excercise = 14 hours* *> Sel study = 14 hours* *> Exam = 2 hours (MID term and final)* *> Exam preparation = 4.3 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Engineering Properties of Materials*
Module objectives/intended learning outcomes	*ILO 3: apply knowledge of mathematics, sciences, and engineering principles in agricultural fields;* *ILO 5: use techniques, skills, and modern tools necessary for agricultural engineering practices;* *ILO 7: design simple equipment, components, or processes needed in agricultural engineering operations;*
Content	*This course provides an opportunity for students to recognize and understand the agricultural workshop management system and introduction to workmanship techniques in the workshop. Coverage of the material consists of an introduction to equipment and work materials (wood and metal) as well as skills in (wood and metal) and skills in using basic equipment and welding both electric and both electric and carburetor welding and an introduction to piping, pneumatic and hydraulic systems. piping, pneumatic and hydraulic systems.*
Examination forms	*Writing and Lab Works*
Study and examination requirements	*Completation of all laboratory reports*
Reading list	*1. Herren, R.V.; E.L. Cooper. 2000. Agricultural Mechanics, Fundamentals and Application, CENGAGE Delmar Learning* *2. F. Nicholson. 1955. Shop Theory. Mc GrawHills 46* *3. Anonymous 2008. Careers in focus: Mechanics. 3rd ed. Infobase pub. USA*

11. Heat Transfer & Thermodynamics Practicum

Module designation	*Heat Transfer and Thermodynamics Practicum*
Semester(s) in which the module is taught	*IV*
Person responsible for the module	*Dr. Gemala Hardinasinta, S.TP*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lab works*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS = 1.7 ECTS = 45.9 hours (1 ECTS around 27 hours)* *> Laboratory session = 12 hours* *> Lab report = 30 hours* *> Virtual experiment = 1 hours* *> Final examination = 2.5 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Engineering Mathematics I* *Engineering Properties of Materials*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 7: Manage and utilise agricultural resources effectively, efficiently, and sustainably; (Competence 1)*
Content	*This course provides an understanding of heat transfer models, namely conduction, convection, and radiation, as well as the mechanisms of heat transfer processes from these three models. The topics covered in this practicum include the evaluation of factors influencing the heat transfer process, temperature distribution within materials for each heat transfer model*
Examination forms	*Writing and oral exam*
Study and examination requirements	*Completion of all laboratory reports*
Reading list	*1. Çengel, Y. A. 1998. Heat Transfer: A Practical Approach. McGraw Hill, Inc. Hightstown, N.J.* *2. Holman, J. P. 2010. Heat Transfer 10th ed. McGraw-Hill. New York* *3. Singh, R. Paul. 2013. Virtual Experiments in Food Processing 2nd Edition. RAR Press. Davis, CA.*

12. Engineering Hydrology Practicum

Module designation	*Engineering Hydrology Practicum*
Semester(s) in which the module is taught	*IV*
Person responsible for the module	*Samsuar, STP., M.Si* *Husnul Mubarak, S.TP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Practices in Laboratory*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS x 1.7 = 1.7 ECTS = 45.9 hours* *> Lecture = 11.6 hours* *> Excercise = 14 hours* *> Sel study = 14 hours* *> Exam = 2 hours (MID term and final)* *> Exam preparation = 4.3 hours*
Credit points	*1 SKS =1.7 ECTS*
Required and recommended prerequisites for joining the module	*Basic Physics* *Fluid Mechanics*
Module objectives/intended learning outcomes	*ILO 3 : apply knowledge of mathematics, sciences, and engineering principles in agricultural fields;* *ILO 4 : use quantitative analysis, information technology and critical thinking in agricultural engineering profession;* *ILO 6 : manage and utilize agricultural resources effectively, efficiently, and sustainably;* *ILO 9 : analyze the impact of engineering solutions to the environment and society using a multidisciplinary approach;*
Content	*The student will be able to demonstrate the understanding of processes and phenomena in hydrological cycles, and also have capability to analyze data in all component hydrology. This course covers: (1) concept of Hydrological Cycle, (2) Data Processing of precipitation, interception, evaporation, surface and subsurface flow, infiltration and percolation, and groundwater, (3) Statistical hydrology and (4) Rainfall-runoff Modeling.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	1. *Linsley Jr., RK., MA Kohler, JLH. Paulhus, 1982. Hydrology for Engineers. Third Edition. McGraw-Hill Inc., New York.* 2. *Asdak, C., 2004. Hydrologi dan Pengelolaan Daerah Aliran Sungai. Gadjah Mada University Press, Yogyakarta.*

13. Agricultural Product Processing Technology and Engineering Practicum

Module designation	*Agricultural Product Processing Technology and Engineering Practicum*
Semester(s) in which the module is taught	*IV*
Person responsible for the module	*Dr.rer.nat. Olly Sanny Hutabarat., S.TP., M.Si* *Dr. Gemala Hardinasinta., S.TP*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lab works*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS = 1.7 ECTS = 45.9 hours (1 ECTS around 27 hours)* *> Laboratory session = 12 hours* *> Lab report = 30 hours* *> Virtual experiment = 1 hours* *> Final examination = 2.5 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Heat transfer and thermodynamics course* *Heat transfer and thermodynamics practicum*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields;* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession* *ILo 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices;* *ILO 6: Design simple equipment, components, or processes needed in agricultural engineering operations* *ILO 7: Manage and utilize agricultural resources effectively, efficiently, and sustainably*
Content	*The topics studied in this course include psychrometrics and air mixing, drying, cooling, storage and handling of fruits. In addition, this course also explains the thermal properties, rheological properties, optical properties, electrical properties, thermodynamic properties, texture and mechanical properties, and flow properties of grain products.*
Examination forms	*Writing and oral exam*
Study and examination requirements	*Completion of all laboratory reports*
Reading list	*1. Ignacio Arana: Physical Properties of Foods: Novel Measurement Techniques and Applications. ISBN: 978-1-4398-3537-1 (eBook - PDF).* *2. Jiri Blahovec and Miroslav Kutilek: Physical methods in agriculture: Approach to precision and quality. ISBN: 978-1-4615-0085-8 (eBook)* *3. Agricultural Process Engineering* *4. CIGR Handbook Volume 4: Agro-Processing Engineering* *5. Postharvest Handling: A Systems Approach*

14. Farm Electrification Practicum

Module designation	*Farm Electricfication Practicum*
Semester(s) in which the module is taught	*IV*
Person responsible for the module	*Muhammad Tahir Sapsal, STP., M.Si* *Muhammad Rizal, S.TP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Practicum*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS x 1.7 = 1.7 ECTS = 45.9 hours* *> Lecture = 11.6 hours* *> Excercise = 14 hours* *> Sel study = 14 hours* *> Exam = 2 hours (MID term and final)* *> Exam preparation = 4.3 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Basic physics* *Farm Electricfication*
Module objectives/intended learning outcomes	*ILO 3: apply knowledge of mathematics, sciences, and engineering principles in agricultural fields;* *ILO 5: use techniques, skills, and modern tools necessary for agricultural engineering practices;*
Content	*This practicum introduces students to electrical codes and rules and discusses low voltage transmission (220 V and 380 V), AC and DC sources, DC circuits, 1- and 3-phase AC, testing procedures, methods of calculating electrical power requirements and power correction factors, electrical installation methods, load distribution (electric heaters, electric motors, lighting). This course includes laboratory practice for 1 and 3 phase AC electrical installations for electric motors, lighting and lamps.*
Examination forms	*Writing and Oral exam*
Study and examination requirements	*Completation of all laboratory reports*
Reading list	*1. Bovay, H.E 1981. Handbook of Mechanical and Electrical Systems for Buildings. McGraw-Hill Book Company* *2. Lister, E.C. 1980. Electric Circuits and Machine. McGraw-Hill Book Company.* *3. Mullin, R.C and R.L. Smith, 1992. Electrical Wiring Commercial. Sixth Edition. Delmar Publishing Inc.* *4. Seidman, A.H., H. Mahrous, and T.G. Hicks 1983. Handbook of Electric Power Calcularions. McGrawHill Book Company.* 5. *Turner, W.C. 1982. Energy Management Handbook. Jonh Wiley & Son. New York.*

15. Engineering Mechanics Practicum

Module designation	*Mechanical Engineering Practicum*
Semester(s) in which the module is taught	*IV*
Person responsible for the module	*Husnul Mubarak S.TP.,M.Si.* *Dr. Gemala Hardinasinta, S.TP*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS x 1.7 = 1.7 ECTS = 45.9 hours* *> Lecture = 11.6 hours* *> Excercise = 14 hours* *> Sel study = 14 hours* *> Exam = 2 hours (MID term and final)* *> Exam preparation = 4.3 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Basic Mathematics* *Basic Physics* *Engineering Mathematics I* *Engineering Mathematics II* *Fluid Mechanics*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 7: Manage and utilise agricultural resources effectively, efficiently, and sustainably; (Competence 1)*
Content	*This course covers the principles of mechanical engineering, namely statics and dynamics, which form the foundation for designing agricultural tools and machinery. This course covers topics such as: dimensions and units, the International System of Units, rigid body statics, equilibrium concepts, center of mass and centroid, moment of inertia, kinematics of linear motion, dynamic principles, momentum and impulse, work and energy, kinematics of curved motion, projectile motion, and rotational kinematics.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*1. Tmoshenko, S and D.H. Young. Engineering Mechanics. Erlangga ,1990* *2. Ferdinand P. B; E.R. Jahuston and Liong, T.H. Mechanics for Engineers: Statics. 1976*

Semester 5

1. Renewable Energy

Module designation	*Renewable Energy*
Semester(s) in which the module is taught	*V*
Person responsible for the module	*Dr. Ir. Supratomo, DEA* *Dr. Ir. Abdul Waris, MT* *Diyah Yumeina RD, STP., M.Agr., Ph.D*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Fluid Mechanics* *Introduction to Climatology* *Engineering Mechanics*
Module objectives/intended learning outcomes	*ILO 3 : Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields* *ILO4: use quantitative analysis, information technology and critical thinking in agricultural engineering profession* *ILO 7 : Design simple equipment, components, or processes needed in agricultural engineering operations*
Content	*This course studies the concepts of energy, conversion of energy, and renewable energy in agriculture. The topicsc include the concept of energy and law of the conservation of energy (the 2nd law of thermodynamics), harvesting of biomass energy (combustion, pyrolysis, gasification and biogas), solar energy, and hydro energy.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*1. Karogirou, Solteris. 2009. Solar Energy Engineering: Processes and System. Academic Press. San Diego* *2. Sørensen, Bent. 2007. Renewable Energy Conversion, Transmission and Storage. Academic Press. San Diego.* *3. Sukandarrumidi, Herry Zadrak Kotta dan Djoko Wintolo. 2014. Energi Terbarukan : Konsep Dasar Menuju Kemandirian Energi. Gadjah Mada University Press, Yogyakarta.* *4. Teodorita Al Seadi, Dominik Rutz, Heinz Prassl, Michael Köttner, Tobias Finsterwalder, Silke Volk, and Rainer Janssen. 2008. Biogas – Handbook. University of Southern Denmark, Esbjerg.*

2. Farm Machinery & Equipment

Module designation	*Farm Machinery & Equipment*
Semester(s) in which the module is taught	*V*
Person responsible for the module	*Dr. Iqbal, STP., M.Si* *Dr. Abdul Azis, STP., M.Si* *Muhammad Tahir Sapsal, STP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture and discussion* *Independent and group assignments*
Workload (incl. contact hours, self-study hours)	*2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Agricultural work* *Workshop techniques Workshop techniques* *Technical Drawingv*
Module objectives/intended learning outcomes	*ILO 3 : apply knowledge of mathematics, sciences, and engineering principles in agricultural fields;* *ILO 5: use techniques, skills, and modern tools necessary for agricultural engineering practices;* *ILO 6: manage and utilize agricultural resources effectively, efficiently, and sustainably;* *ILO 8: demonstrate capacity in operating agricultural engineering related business either as producer or service provider;*
Content	*The Agricultural Tools and Machinery course studies and agricultural machinery used in crop cultivation activities from pre-harvest to harvest (on farm). This course contains explanations about the scope and definition of tools and machinery agriculture, agricultural tractors (2 and 4 wheels) and their implements. In addition, this course also discusses the working principles, operation, and maintenance of agricultural equipment. working principles, operation, and maintenance of planting equipment, chemical application equipment, weeding equipment, and harvesting equipment. harvesting tools. This course is conducted using the following methods lectures (explaining the theory), demonstrations through videos, examples of problems, giving independent assignments to students, and practicum.*
Examination forms	*Writing and essay, etc.*
Study and examination requirements	*Attendance Above 80%*
Reading list	*1. Ciptohadijoyo, S. 1999. Alat dan Mesin Pertanian. Fakultas Teknologi Pertanian Universitas GadjahMada. Jogjakarta.* *2. Darun, S. Matondang, Sumono. 1983. Pengantar Alat dan Mesin-Mesin Perkebunan. Fakultas Pertanian Universitas Sumatera Utara.Medan.* *3. Harris Pearson Smith, A.E., Lambert Henry Wilkes, M. S. 1988. Farm Machinery and Equipment. McGraw-Hill Publishing*

3. Computer Programming

Module designation	*Computer Programming*
Semester(s) in which the module is taught	*V*
Person responsible for the module	*Prof. Dr. Ir. Ahmad Munir, M.Eng* *Dr. Suhardi, STP., MP* *Ir. Helmi A. Koto, M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel Study = 28 hours* *> Exam = 4 hours (MID term and final)* *>Exam preparation= 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Engineering Mathematics*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)*
Content	*This course discusses the preparation of a series of instructions that are translated from a system (especially systems in the field of agricultural engineering) in the form of specific functions and then translated into computer program languages. The subject begins with an introduction to the source code which is a code that can be read by humans and then coded for the language of computer programs, building program algorithms, making programs in computer program languages and program execution. Thus, this course will shape students' skills in thinking logically, structured and able to formulate problems encountered in everyday life in the field of agricultural engineering into mathematical functions and translate them into computer program languages.*
Examination forms	*Writing exam*
Study and examination requirements	*Attendance above 80%*
Reading list	-

4. Irrigation and Drainage Engineering

Module designation	*Irrigation and Drainage Engineering*

Semester(s) in which the module is taught	*V*
Person responsible for the module	*Prof. Dr. Ir. Ahmad Munir, M.Eng* *Dr. Ir. Mahmud Achmad, MP* *Dr. Ir. Daniel Useng, M.Eng.Sc* *Dr. Suhardi, STP., MP*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS =3.4 ECTS*
Required and recommended prerequisites for joining the module	*Hydrology Engineering* *Fundamentals of Climatology* *Land Surveying* *Fluid Mechanics*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 6: Design simple equipment, components, or processes needed in agricultural engineering operations; (Skill 2)*
Content	*The student will be able to demonstrate the understanding of processes and phenomena in hydrological cycles, and also have capability to analyze data in all component hydrology. This course covers: (1) concept of Hydrological Cycle, (2) Data Processing of precipitation, interception, evaporation, surface and subsurface flow, infiltration and percolation, and groundwater, (3) Statistical hydrology and (4) Rainfallrunoff Modeling.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*1. Linsley Jr., RK., MA Kohler, JLH. Paulhus, 1982. Hydrology for Engineers. Third Edition. McGraw-Hill Inc., New York.* *2. Asdak, C., 2004. Hydrologi dan Pengelolaan Daerah Aliran Sungai. Gadjah Mada University Press, Yogyakarta.*

5. Renewable Energy Practicum

Module designation	*Renewable Energy Practicum*
Semester(s) in which the module is taught	*V*
Person responsible for the module	*Dr. Ir. Supratomo, DEA* *Dr. Ir. Abdul Waris, MT* *Diyah Yumeina RD, STP., M.Agr., Ph.D*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lab works*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS = 1.7 ECTS = 45.9 hours (1 ECTS around 27 hours)* *> Laboratory session = 12 hours* *> Lab report = 30 hours* *> Virtual experiment = 1 hours* *> Final examination = 2.5 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Fluid Mechanics* *Introduction to Climatology* *Engineering Mechanics*
Module objectives/intended learning outcomes	*ILO3: apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO4: use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 1)* *ILO7: design simple equipment, components, or processes needed in agricultural engineering operations; (Competence 1)*
Content	*This course studies the concepts of energy, conversion of energy, and renewable energy in agriculture. The topics include the concept of energy and law of the conservation of energy (the 2nd law of thermodynamics), harvesting of biomass energy (combustion, pyrolysis, gasification and biogas), solar energy, and hydro energy.*
Examination forms	*Writing and oral exam*
Study and examination requirements	*Completion of all laboratory reports*
Reading list	1. *Karogirou, Solteris. 2009. Solar Energy Engineering: Processes and System. Academic Press. San Diego* 2. *Sørensen, Bent. 2007. Renewable Energy Conversion, Transmission and Storage. Academic Press. San Diego.* 3. *Sukandarrumidi, Herry Zadrak Kotta dan Djoko Wintolo. 2014. Energi Terbarukan : Konsep Dasar Menuju Kemandirian Energi. Gadjah Mada University Press, Yogyakarta.* 4. *Teodorita Al Seadi, Dominik Rutz, Heinz Prassl, Michael Köttner, Tobias Finsterwalder, Silke Volk, and Rainer Janssen. 2008. Biogas – Handbook. University of Southern Denmark, Esbjerg.*

6. Farm Machinery & Equipment Practicum

Module designation	*Farm Machinery & Equipment Practicum*
Semester(s) in which the module is taught	*V*
Person responsible for the module	*Dr. Iqbal, STP., M.Si* *Dr. Abdul Azis, STP., M.Si* *Muhammad Tahir Sapsal, STP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lab works*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS = 1.7 ECTS = 45.9 hours (1 ECTS around 27 hours)* *> Laboratory session = 12 hours* *> Lab report = 30 hours* *> Virtual experiment = 1 hours* *> Final examination = 2.5 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Mechanical Workshop Practicum* *Engineering Design*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 7: Manage and utilise agricultural resources effectively, efficiently, and sustainably; (Competence 1)* *ILO8: demonstrate capacity in operating agricultural engineering related business either as producer or service provider; (Competence 1)*
Content	*1. Able to operate modern agricultural tools and machinery modern agricultural tools and machinery. In addition, they are able to develop themselves and think logically-analytically as well as their ability to work and develop creativity based on the value of maritime culture.* *2. Understand the concept of agricultural labor and its classification* *3. Explain the construction and working principles of combustion motors and tractors* *4. Explain the differences between various types of tractors*
Examination forms	*Writing and oral exam*
Study and examination requirements	*Completion of all laboratory reports*
Reading list	*1. Principles of Farm Machinery; Tractors and Their Power Unit* *2. Schwab, G.O., R.K. Frevert, T.W. Edminster, and K.K. Barnes. 1981. Soil and Water Conservation Engineering. Third Edition. John Wiley & Sons. New York.* *3. Arsyad, S. 2006. Konservasi Tanah dan Air. IPB Press. Edisi kedua. Darmaga, Bogor*

7. Food Process Engineering Practicum

Module designation	*Food Process Engineering Practicum*
Semester(s) in which the module is taught	*V*
Person responsible for the module	*Dr. Ir. Supratomo, DEA* *Prof. Dr. Ir. Salengke, M.Sc* *Prof. Dr. Ir. Mursalim*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lab works*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS = 1.7 ECTS = 45.9 hours (1 ECTS around 27 hours)* *> Laboratory session = 12 hours* *> Lab report = 30 hours* *> Virtual experiment = 1 hours* *> Final examination = 2.5 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Food ProcessingTechnology* *Heat Transfer*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 7: Manage and utilise agricultural resources effectively, efficiently, and sustainably; (Competence 1)* *ILO8: demonstrate capacity in operating agricultural engineering related business either as producer or service provider; (Competence 1)*
Content	*At the end of the lesson, students are expected to be able to:* *1. Explain food processing techniques in each operating unit to get optimal results.* *2. Applying the principles of physics and engineering to food processing.* *3. Complete calculations either manually or by using a computer program.*
Examination forms	*Writing and oral exam*
Study and examination requirements	*Completion all the report practicum*
Reading list	*Singh, R. P. and Dennis R. Heldman. 2009. Introduction to Food Engineering 4th ed. Academic Press. San Diego..*

8. Computer Programming Practicum

Module designation	*Computer Programming Practicum*
Semester(s) in which the module is taught	*V*
Person responsible for the module	*Prof. Dr. Ir. Ahmad Munir, M.Eng.* *Dr. Suhardi, STP., MP*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lab works*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS = 1.7 ECTS = 45.9 hours (1 ECTS around 27 hours)* *> Laboratory session = 12 hours* *> Lab report = 30 hours* *> Virtual experiment = 1 hours* *> Final examination = 2.5 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Engineering Mathematics*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)*
Content	*This course discusses the preparation of a series of instructions that are translated from a system (especially systems in the field of agricultural engineering) in the form of specific functions and then translated into computer program languages.*
Examination forms	*Writing and practice*
Study and examination requirements	*Attendance above 80%* *Complecion all exams*
Reading list	

9. Irrigation and Drainage Engineering Practicum

Module designation	*Irrigation And Drainage Engineering Practicum*
Semester(s) in which the module is taught	*V*
Person responsible for the module	*Samsuar, S.TP., M.Si* *Husnul Mubarak, S.TP., M.Si.*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture, Lab Works*
Workload (incl. contact hours, self-study hours)	*Estimated) Total workload:* *1 SKS x 1.7 = 1.7 ECTS = 45.9 hours* *> Lecture = 11.6 hours* *> Excercise = 14 hours* *> Sel study = 14 hours* *> Exam = 2 hours (MID term and final)* *> Exam preparation = 4.3 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Irrigation And Drainage Engineering*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 6: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)*
Content	*The student will be able to demonstrate the understanding of processes and phenomena in hydrological cycles, and also have capability to analyze data in all component hydrology. This course covers: (1) concept of Hydrological Cycle, (2) Data Processing of precipitation, interception, evaporation, surface and subsurface flow, infiltration and percolation, and groundwater, (3) Statistical hydrology and (4) Rainfall runoff Modeling.*
Examination forms	*Writing, oral presentation*
Study and examination requirements	*Attendance above 80%*
Reading list	*Schofield, W. & M. Breach, 2007. Engineering Surveying. Sixth Edition, Butterworth-Heinemann Elsevier. Sydney.*

Semester 6

1. Soil & Water Conservation Engineering

Module designation	*Soil & Water Conservation Engineering*
Semester(s) in which the module is taught	*VI*
Person responsible for the module	*Prof. Dr. Ir. Ahmad Munir, M.Eng* *Dr. Ir. Sitti Nur Faridah, MP* *Dr. Suhardi, STP., MP*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Irrigation and Drainage Technique* *Engineering Hydrology* *Introduction to Climatology*
Module objectives/intended learning outcomes	*ILO3: apply knowledge of mathematics, sciences, and engineering principles in agricultural fields* *ILO5: use techniques, skills, and modern tools necessary for agricultural engineering practices* *ILO6: manage and utilize agricultural resources effectively, efficiently, and sustainably* *ILO9: analyze the impact of engineering solutions to the environment and society using a multidisciplinary approach* *ILO10: explore and develop effective solutions related to agricultural engineering issues*
Content	*This course discusses the engineering principles involved in soil and water conservation. The discussion includes the classification of water erosion, and the agronomical and engineering measures adopted for erosion control. The design of the bunds and terraces are discussed in detail, followed by gully control measures. The wind erosion and measures to control it, for example, windbreaks and shelterbelt, are also discussed. Many examples and problems are included to emphasize design principles and to facilitate understanding of subject matter, including discussing several computer models described and demonstrated.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*1. Schwab, G.O., R.K. Frevert, T.W. Edminster, and K.K.* *2. Barnes. 1981. Soil and Water Conservation Engineering. Third Edition. John Wiley & Sons. New York.* *3. Arsyad, S. 2006. Konservasi Tanah dan Air. IPB Press. Edisi kedua. Darmaga, Bogor*

2. Automatic Control System Practicum

Module designation	*Automatic Control System Practicum*
Semester(s) in which the module is taught	*VI*

Person responsible for the module	*Dr. Abdul Azis, STP., M.Si* *Muhammad Tahir Sapsal, STP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Writing and Lab Works*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS x 1.7 = 1.7 ECTS = 45.9 hours* *> Lecture = 11.6 hours* *> Excercise = 14 hours* *> Sel study = 14 hours* *> Exam = 2 hours (MID term and final)* *> Exam preparation = 4.3 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Modelling and Simulation* *Computer Programming* Farm Electrification *Instrumentation*
Module objectives/intended learning outcomes	*ILO 3: apply knowledge of mathematics, sciences, and engineering principles in agricultural fields;* *ILO 4: use quantitative analysis, information technology and critical thinking in agricultural engineering profession;* *ILO 5: use techniques, skills, and modern tools necessary for agricultural engineering practices;*
Content	*This course provides an opportunity for students to recognize and understand the agricultural workshop management system and introduction to workmanship techniques in the workshop. Coverage of the material consists of an introduction to equipment and work materials (wood and metal) as well as skills in (wood and metal) and skills in using basic equipment and welding both electric and both electric and carburetor welding and an introduction to piping, pneumatic and hydraulic systems. piping, pneumatic and hydraulic systems.*
Examination forms	*Writing and Lab Works*
Study and examination requirements	*Completation of all laboratory reports*
Reading list	*1. Bennett, Stuart, 1988. Real-Time Computer Control, Prentice Hall, International,Inc.* *2. De Silva, C.W. 1989. Control Sensors and Actuators, Prentice Hall, Englewood Cliffs, New Jersey.* *3. Jamshidi M, Nader Vafdiee and Timothy Ross, 1993. Fuzzy Logic and Control. Prentice Hall, International,Inc* *4. Ogata, K. 1997. Modern control Engineering, third editian, Prentice Hall International,Inc.* *5. Yan J, Michael Ryan and James Power, 1994. Using Fuzzy Logic. Prentice Hall, International,Inc.*

3. Operation Research

Module designation	*Operation Research*
Semester(s) in which the module is taught	*VI*
Person responsible for the module	*Dr. Ir. Supratomo, DEA* *Prof. Dr. Ir. Salengke, M.Sc* *Prof. Dr. Ir. Mursalim*
Language	*Indonesia*
Relation to curriculum	*Elective*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel Study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation= 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Biology* *Thermodynamics* *Heat Transfer* *Food Processing Engineering I*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 7: Manage and utilize agricultural resources effectively, efficiently, and sustainably; (Competence 1)* *ILO 8: Demonstrate capacity in operating agricultural engineering related business either as producer or service provider; (Competence 2)*
Content	*The purpose of this course is to provide students with knowledge and analytical and problem-solving skills necessary to analyze processes applied in food processing operations. Topics that will be covered in this course include the concepts and principles applied in food engineering, mass and energy balances, fluid flows, psychometric chart, heat and mass transfer, drying, evaporation, refrigeration, and food freezing.*
Examination forms	*Writing exam*
Study and examination requirements	*Attendance above 80%*
Reading list	*Singh, R. P. and Dennis R. Heldman. 2009. Introduction to Food Engineering 4th ed. Academic Press. San Diego.*

4. Engineering Economy

Module designation	*Engineering Economics*
Semester(s) in which the module is taught	*VI*
Person responsible for the module	*Prof. Dr. Ir. Salengke, M.Sc.* *Prof. Dr. Ir. Mursalim* *Dr. Diyah Yumeina, STP, M.Sc.*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS =3.4 ECTS*
Required and recommended prerequisites for joining the module	*Basic Mathematics* *Engineering Mathematics I* *Engineering Mathematics II* *Applied Statistics*
Module objectives/intended learning outcomes	*ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 7: Manage and utilise agricultural resources effectively, efficiently, and sustainably; (Competence 1)* *ILO 8: Demonstrate capacity in operating agricultural engineering related business either as producer or service provider; (Competence 2)*
Content	*Engineering Economy deals with methods for systematic evaluation of economic feasibility of engineering projects or investment based on costs and revenue estimations. Topics and concepts that will be covered in this course include decision making, costs, benefits, and cash flow, interest and time value of money, uses and formulation of interest factors, present worth analysis, uniform annual cash flow analysis, benefit-cost ratio analysis, and internal rate of return. Other topics that will be covered include incremental analysis for multiple alternatives, breakeven point analysis, payback period analysis, depreciation costs), and replacement analysis.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*1. Salengke: Engineering Economy: Techniques for Project and Business Feasibility Analysis. ISBN: 978-602- 8405-35-5.* *2. Donald G. Newman and Bruce Johnson, Engineering Economic Analysis, Engineering Press, Inc., ISBN: 0- 910554-93-5.* *3. Leland T. Blank and Anthony J. Tarquin, Engineering Economy. ISBN: 0-07-062982-X*

5. Entrepreneurship

Module designation	*Entrepreneurship*
Semester(s) in which the module is taught	*VI*
Person responsible for the module	*Muhammad Tahir Sapsal, STP., M.Si.* *Diyah Yumeona, STP., M.Agr., Ph.d* *Samsuar, STP., M.Si.*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	*ILO 7: Manage and utilise agricultural resources effectively, efficiently, and sustainably; (Competence 1)* *ILO8: demonstrate capacity in operating agricultural engineering related business either as producer or service provider; (Competence 1)*
Content	*1. identify market needs and capitalize on market opportunities* *2. know strategies in business* *3. plan business and evaluate business opportunities business opportunities* *4. understand entrepreneurial ethics* *5. know the concept of green entrepreneurship* *6. think creatively and innovatively, and be able to work in a team in a team*
Examination forms	*Writing exam*
Study and examination requirements	*Attendence above 80%*
Reading list	*1. Longenecker, J.G. and C.W. Moore. Small Business Management. South-Western Pub. Co., Cincinnati, Ohio, USA. 1991* *2. Osterwalder, A. and Pigneur Y. Busines Model Generation. John Wiley & Sons, Inc. 2010*

6. Numerical Analysis

Module designation	*Numerical Analysis*
Semester(s) in which the module is taught	*VI*
Person responsible for the module	*Dr. Ir. Mahmud, MP.* *Prof. Dr. Ir. Salengke,M.Sc.* *Dr. Suhardi, STP., MP*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Applied Statistics*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 9: Analyze the impact of engineering solutions to the environment and society using a multidisciplinary approach; (Competence 3)*
Content	*This course covers introduction to computer programming and software, Gauss-Jordan elimination and LU factorization, root of equations, regression techniques, interpolation techniques, numerical integration and numerical differentiation. Some numerical cases related to agricultural engineering.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*Chapra, SC., RP. Canale, 2015. Numerical Methods for Engineers, 7th Edition, McGraw-Hill Higher Education, New York.*

7. Farm Structure & Environment

Module designation	*Farm Structure & Environment*
Semester(s) in which the module is taught	*VI*
Person responsible for the module	*Dr. Ir. Sitti Nur Faridah, MP.* *Dr.rer.nat. Olly Sanny Hutabarat, STP.,M.Si.* *Dr. Ir. Abdul Waris, MT* *Samsuar, STP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture, Excercise.*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Engineering Properties of Materials*
Module objectives/intended learning outcomes	*ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 7: Manage and utilize agricultural resources effectively, efficiently, and sustainably; (Competence 1)* *ILO 9: Analyze the impact of engineering solutions to the environment and society using a multidisciplinary approach; (Competence 3)*
Content	*The course of Building and Agricultural Environmental Sciences studies the structure of buildings and the fundamentals of functional planning of agricultural buildings and the influencing environment. This course discusses agricultural buildings, including the planning of farm center buildings, the fundamentals of controlling indoor environmental conditions naturally and mechanically, and their application to crop and livestock production*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*1. Whitakher, J. F. 1979. Agricultural Building and Structure* *2. Barre,H, J and Sammet, L,L., 1996. Frame Structures* *3. Esmay, L. Merle and Dixon, E. Jhon., 1986. Environmental Control for Agricultural Buildings*

8. Soil & Water Conservation Engineering Practicum

Module designation	*Soil & Water Conservation Engineering Practicum*
Semester(s) in which the module is taught	*VI*
Person responsible for the module	*Prof. Dr. Ir. Ahmad Munir, M.Eng* *Dr. Ir. Sitti Nur Faridah, MP* *Dr. Suhardi, STP., MP*
Language	*Indonesia*
Relation to curriculum	*Elective*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Irrigation and Drainage Technique* *Engineering Hydrology* *Introduction to Climatology*
Module objectives/intended learning outcomes	*ILO3: apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO5: use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO6: manage and utilize agricultural resources effectively, efficiently, and sustainably; (Skill 2)* *ILO9: analyze the impact of engineering solutions to the environment and society using a multidisciplinary approach; (Competence 3)* *ILO10: explore and develop effective solutions related to agricultural engineering issues. (Competence 4)*
Content	*This course discusses the engineering principles involved in soil and water conservation. The discussion includes the classification of water erosion, and the agronomical and engineering measures adopted for erosion control. The design of the bunds and terraces are discussed in detail, followed by gully control measures. The wind erosion and measures to control it, for example, windbreaks and shelterbelt, are also discussed. Many examples and problems are included to emphasize design principles and to facilitate understanding of subject matter, including discussing several computer models described and demonstrated.*
Examination forms	*Writing exam*
Study and examination requirements	*Attendence above 80%*
Reading list	*1.* Schwab, G.O., R.K. Frevert, T.W. Edminster, and K.K. *2.* Barnes. 1981. Soil and Water Conservation Engineering. Third Edition. John Wiley & Sons. New York. *3.* Arsyad, S. 2006. Konservasi Tanah dan Air. IPB Press. Edisi kedua. Darmaga, Bogor

9. Automatic Contol System Practicum

Module designation	*Automatic Control System Practicum*
Semester(s) in which the module is taught	*VI*
Person responsible for the module	*Dr. Abdul Azis, STP., M.Si* *Muhammad Tahir Sapsal, STP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Writing and Lab Works*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *1 SKS x 1.7 = 1.7 ECTS = 45.9 hours* *> Lecture = 11.6 hours* *> Excercise = 14 hours* *> Sel study = 14 hours* *> Exam = 2 hours (MID term and final)* *> Exam preparation = 4.3 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	Modelling and Simulation Computer Programming Farm Electrification Instrumentation
Module objectives/intended learning outcomes	*ILO 3: apply knowledge of mathematics, sciences, and engineering principles in agricultural fields;* *ILO 4: use quantitative analysis, information technology and critical thinking in agricultural engineering profession;* *ILO 5: use techniques, skills, and modern tools necessary for agricultural engineering practices;*
Content	*This course provides an opportunity for students to recognize and understand the agricultural workshop management system and introduction to workmanship techniques in the workshop. Coverage of the material consists of an introduction to equipment and work materials (wood and metal) as well as skills in (wood and metal) and skills in using basic equipment and welding both electric and both electric and carburetor welding and an introduction to piping, pneumatic and hydraulic systems. piping, pneumatic and hydraulic systems.*
Examination forms	*Writing and Lab Works*
Study and examination requirements	*Completation of all laboratory reports*
Reading list	*1. Bennett, Stuart, 1988. Real-Time Computer Control, Prentice Hall, International,Inc.* *2. De Silva, C.W. 1989. Control Sensors and Actuators, Prentice Hall, Englewood Cliffs, New Jersey.* *3. Jamshidi M, Nader Vafdiee and Timothy Ross, 1993. Fuzzy Logic and Control. Prentice Hall, International,Inc* *4. Ogata, K. 1997. Modern control Engineering, third editian, Prentice Hall International,Inc.* *5. Yan J, Michael Ryan and James Power, 1994. Using Fuzzy Logic. Prentice Hall, International,Inc.*

10. Entrepreneurship Practicum

Module designation	*Entrepreneurship Practicum*
Semester(s) in which the module is taught	*VI*
Person responsible for the module	*Husnul Mubarak, S.TP., M.Si* *Haerani, STP.,M.Eng.Sc.*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture and in-depth discussion*
Workload (incl. contact hours, self-study hours)	*Estimated) Total workload:* *1 SKS x 1.7 = 1.7 ECTS = 45.9 hours* *> Lecture = 11.6 hours* *> Excercise = 14 hours* *> Sel study = 14 hours* *> Exam = 2 hours (MID term and final)* *> Exam preparation = 4.3 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Engineering Professional Ethics*
Module objectives/intended learning outcomes	*ILO 7: design simple equipment, components, or processes needed in agricultural engineering operations; (Competence 1)* *ILO 8: demonstrate capacity in operating agricultural engineering related business either as producer or service provider; (Competence 2)*
Content	*The entrepreneurship practicum course learns the fundamental concepts of entrepreneurship, market needs identification, seizing opportunities, and realizing them in the form of a business. It covers entrepreneurship strategies, evaluating business opportunities for a product and service, business ethics, and entrepreneurship ethics. It also encompasses business development, teamwork, and motivation for entrepreneurship, creative and innovative thinking.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*1. Longenecker, J.G. and C.W. Moore. Small Business Management. South-Western Pub. Co., Cincinnati, Ohio, USA. 1991* *2. Osterwalder, A. and Pigneur Y. Busines Model Generation. John Wiley & Sons, Inc. 2010*

Elective

1. Modelling and Simulation

Module designation	*Modeling and Simulation*
Semester(s) in which the module is taught	*Elective*
Person responsible for the module	*Dr. Ir. Mahmud Achmad, MP* *Prof. Dr. Ir. Junaedi Muhidong, M.Sc* *Prof. Dr. Ir. Salengke, M.Sc*
Language	*Indonesia*
Relation to curriculum	*Elective*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Engineering Drawing* *Engineering Drawing Practicum* *Engineering Design* *Engineering Mathematics I* *Engineering Mathematics II*
Module objectives/intended learning outcomes	*ILO3: apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO4: use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 1)*
Content	*1. Student will be able to demonstrate general understanding of Mathematical modeling and Simulation related to Agricultural Field.* *2. Students will have skill to draw a concept of mathematical modeling* *3. Students will have skill to simulate a mathematical model.*
Examination forms	*Writing exam*
Study and examination requirements	*Attendence above 80%*
Reading list	*Hangos, K. amd I. Cameron, 2001. Process Modelling and Model Analysis. Academic Press, California*

2. Information System

Module designation	*Information System*
Semester(s) in which the module is taught	*Elective*
Person responsible for the module	*Dr. Ir. Supratomo, DEA* *Prof. Dr. Ir. Ahmad Munir, M.Eng* *Samsuar, STP., M.Si.*
Language	*Indonesia*
Relation to curriculum	*Elective*
Teaching methods	*Lectures*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	*ILO 5: use techniques, skills, and modern tools necessary for agricultural engineering practices;*
Content	*This course introduces students to information system and its application in agricultural engineering field. Topics that will be covered include introduction to information systems, basic concepts, components and types of information system, database development, development of information system based applications, and application of information system for Geographical Information System.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	1. *O'Brien, J. A. and G. M. Marakas. 2010. Introduction to Information Systems 5th Ed. McGraw-Hill Companies, Inc., New York.* 2. *Stair, R. M. and G. W. Reynolds. 2012. Fundamentals of Information Systems 6th Ed.* 3. *Course Technology, Cengage Learning, Boston.*

3. Artifical Inteligence

Module designation	*Artificial Intelligence*
Semester(s) in which the module is taught	*Elective*
Person responsible for the module	*Dr. Ir. Abdul Waris, MT.* *Muhammad Tahir Sapsal, S.TP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Elective*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*1 SKS = 1.7 ECTS*
Required and recommended prerequisites for joining the module	*Basic mathematics* *Computer Programming* *Farm Machinery*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 7: Design simple equipment, components, or processes needed in agricultural engineering operations;*
Content	*This course provides students with an understanding of artificial intelligence. The topics covered include the scope, basic concepts, and disciplines within artificial intelligence, expert systems, fuzzy logic, and artificial neural networks. The expert systems topic covers basic concepts, structure, methods of knowledge representation, and their application. The fuzzy logic topic discusses membership functions, fuzzy set operations, implication operators, fuzzy inference systems, and their application in instrumentation and control systems. The topic of artificial neural networks covers concepts, components, activation functions, learning algorithms, and the application of neural networks in simple machines. This course includes laboratory practices to enhance comprehension of the material covered in this course.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*1. Negnevitsky, M. 2005. Artificial Intelligence A Guide to Intelligent Systems. Second Edition. Addison-Wesley.* *2. Hanafiah, K., A. 2007. Dasar-Dasar ILmu Tanah. Rajawali Pers: Jakarta Siang, J.J. 2005. Jaringan Syaraf Tiruan dan Pemogramannya Mengguanakan Matlab. Andi Yogyakarta.* *3. Yen,J., Langari, R., dan Zadeh, L.A. 1995. Industrial Application of Fuzzy logic and Intelligent Systems. The Institute of Electrical and Electronisc Engineers, Inc.,New York.*

4. Agro-informatics

Module designation	*Agro-informatics*
Semester(s) in which the module is taught	*Elective*
Person responsible for the module	*Prof. Dr. Ir. Ahmad Munir, M.Eng* *Haerani, S.TP., M.Eng.Sc.*
Language	*Indonesia*
Relation to curriculum	*Elective*
Teaching methods	*Lecture and in-depth discussion* *Tutorial* *Independent assignment* *Mini Project*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Basic Knowledge of Computer Programming* *Software for Agriculture*
Module objectives/intended learning outcomes	*ILO 5 : use techniques, skills, and modern tools necessary for agricultural engineering practices;* *ILO 6 : manage and utilize agricultural resources effectively, efficiently, and sustainably;*
Content	*Student will be able to demonstrate the understanding about agricultural data and their transformation to information system, and have skill to design simple information system related to agricultural engineering field using dbase or web-base software in presenting lump and distributed data. This course covers (1) Data, information and informatics tools, (2) Presentation techniques of database and web-base data, (3) The usage of Internet to prepare spatial and non-spatial information (4) Some cases in Agricultural Engineering area (5) Mini project in Agro-informatics.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*1. Iványi, A. (Editor), 2007. Algorithms of Informatics Vol 2: Applications. Pub. MondAt Kiadó, Budapest.* *2. Kumar, P., M. Folk, M. Markus, JC. Alameda, 2005. Hydroinformatics: data integrative approaches in computation, analysis, and modeling. CRC Press, Boca Raton*

5. Statistical Quality Control

Module designation	*Statistical Quality Control*
Semester(s) in which the module is taught	*Elective*
Person responsible for the module	*Dr. Ir. Supratomo, DEA* *Diyah Yumeina RD, STP., M.Agr., Ph.D*
Language	*Indonesia*
Relation to curriculum	*Elective*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Exercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Basic statistics*
Module objectives/intended learning outcomes	*ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices*
Content	*TThis course is designed to introduce students to the concept of quality in a production process and apply statistical tools to ensure product quality. This course will teach students about statistical concepts, quality control, and application of statistical techniques as quality control tools.*
Examination forms	*Writing exam*
Study and examination requirements	*At least 80% attendance for students to be able to take the exam*
Reading list	*1. Walpole, R. E. and Raymond H. Myers. 2007. Probability and Statistics for Engineers and Scientists 8th ed. Pearson Prentice Hall. London. (Terjemahan: Pengantar Statistika edisi ke-3. 1993. PT. Gramedia Pustaka Utama, Jakarta.).* *2. Montgomery, Douglas C. 2009. Introduction to Statistical Quality Control, 6th Ed. John Wiley & Sons, Inc. Danvers, MA.*

6. Experimental Design

Module designation	*Experimental Design*
Semester(s) in which the module is taught	*Elective*
Person responsible for the module	*Dr. Ir. Supratomo, DEA* *Prof. Dr. Ir. Mursalim*
Language	*Indonesia*
Relation to curriculum	*Elective*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS =3.4 ECTS*
Required and recommended prerequisites for joining the module	*Basic Mathematics* *Engineering Design* *Engineering Mathematics I* *Engineering Mathematics II*
Module objectives/intended learning outcomes	*ILO 4 : Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 10 : Explore and develop effective solutions related to agricultural engineering issues. (Competence 4)*
Content	*This course discusses various types of experimental designs that can be applied in agricultural engineering research. Topics that will be covered include introduction to experimental design concepts, design of experiment using completely randomized design, randomized block design, Latin Square design, factorial experiments and split-plot designs, and data analysis using analysis of variance, Least Significance Different, honestly significance difference and Tukey's w-procedure*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*1. Gomez, K. A. dan A.A. Gomez. 1995. Prosedur Statistik untuk Penelitian Pertanian (Statistical Procedures for Agricultural Research) edisi kedua. Penerbit Universitas Indonesia (UI Press). Jakarta.* *2. Steel, R. G. D. dan J. H. Torrie. 1993. Prinsip dan Prosedur Statistika: Suatu Pendekatan Biometrik (Principles and Procedures of Statistics) cetakan ketiga. PT. Gramedia Pustaka Utama, Jakarta*

7. System Analysis

Module designation	*System Analysis*
Semester(s) in which the module is taught	*Elective*
Person responsible for the module	*Prof. Dr. Ir. Junaedi Muhidong, M.Sc* *Dr. Ir. Mahmud Achmad, MP*
Language	*Indonesia*
Relation to curriculum	*Elective*
Teaching methods	*Lecture and in-depth discussion* *Independent assignment*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Introduction to system analysis*
Module objectives/intended learning outcomes	*ILO 3 : apply knowledge of mathematics, sciences, and engineering principles in agricultural fields;* *ILO 9 : analyze the impact of engineering solutions to the environment and society using a multidisciplinary approach;* *ILO 10 : explore and develop effective solutions related to agricultural engineering issues.*
Content	*This course introduces students to system analysis in agricultural engineering. Topics covered include systems analysis approaches, system components and characteristics, identification of system components, development of causal loops and feedback of system components, development of flow chart algorithm models of systems.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*1. Athey, T.H.1982. Sistematic Systems Approach, an Integrated for Solving Problems, Prentice-Hall, Inc. Englewood Cliffis, New Jersey* *2. Eriyatno, 2003.Ilmu Sistem. Meningkatkan Mutu dan Efektifitas Manajemen. Edisi Ke tiga. IPB Press. Bogor.* *3. Manetsch, T, J. and G. L, Prk.1977. System analysis and Simulation with Aplicatians to Economic and Social System Departmen of Electrical Engineering and system sciences, Michigan State University, Michigan.*

8. Farm machinery Management

Module designation	*Farm Machinery Management*
Semester(s) in which the module is taught	*Elective*
Person responsible for the module	*Dr. Iqbal Salim, STP., M.Si* *Dr. Abdul Azis, STP., M.Si* *Muhammad Tahir Sapsal, STP., M.Si.*
Language	*Indonesia*
Relation to curriculum	*Elective*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Exercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Farm Machinery Subject*
Module objectives/intended learning outcomes	*ILO 6: Design simple equipment, components, or processes needed in agricultural engineering operations* *ILO 8: Demonstrate capacity in operating agricultural engineering related business either as producer or service provider*
Content	*This course discusses the management of agricultural tools and machinery for farming cultivation, ranging from land preparation to harvesting; determination of basic costs of operating tools and machinery; machine capacity and efficiency; feasibility and economic analysis; and machinery selection.*
Examination forms	*Writing exam*
Study and examination requirements	*At least 80% attendance for students to be able to take the exam*
Reading list	*1. CIGR (The International Commission of Agricultural Engineering). 1999. CIGR Handbook of Agricultural Engineering Vol. III Plant Production* *2. Engineering. The American Society of Agricultural Engineers.* *3. 2. Landers, A. 2000. Farm Machinery:Selection, Investment, and Management. Farming Press, Tonbridge.* *4. 3. Hunt, D. 1995. Farm Power and Machinery Management 9th edition. Iowa State University Press, Iowa.*

9. Water Resources Management

Module designation	*Water Resources Management*
Semester(s) in which the module is taught	*Elective*
Person responsible for the module	*Dr. Ir Sitti Nur Faridah, MP.* *Dr. Suhardi, STP., MP.*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Enginering Hidrology* *Fluid of Mechanics*
Module objectives/intended learning outcomes	*ILO 6: manage and utilize agricultural resources effectively, efficiently, and sustainably*
Content	*This lecture discusses the definition and scope of Water Resources Management activities; basic principles, principles; institutions and introduction of regulations, legislation related to Water Resources Management, water source supply systems, types and methods of water demand estimates (irrigation and non-irrigation), data requirements for Water Resources Management, determination of reservoir capacity, reservoir release regulation method, optimization of water allocation models, macro and micro scale flood control, environmental aspects in Water Resources Management.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*UU No. 7 th 2004 tentang Sumber Daya Air • Grigg, N.S., 1996. Water Resources Management: Principles, Regulation, and Cases. New York: McGraw Hill.*

10. Agroindustrial Management

Module designation	*Agroindustrial Management*
Semester(s) in which the module is taught	*Elective*
Person responsible for the module	*Prof. Dr. Ir. Mursalim* *Dr. Iqbal, STP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Elective*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS =3.4 ECTS*
Required and recommended prerequisites for joining the module	*Agroinformatics* *Information System*
Module objectives/intended learning outcomes	*ILO 6 : Design simple equipment, components, or processes needed in agricultural engineering operations; (Skill 2)* *ILO 8 : Demonstrate capacity in operating agricultural engineering related business either as producer or service provider; (Competence 2)*
Content	*The purpose of this course is to enable students to articulate the concept of agro-industrial management by aligning technoware, humanware, infoware with Organware. The material of this course discusses concepts of technology, agro-industry, technology and agro-industry management, characteristics of technology and agro-industry, research and development strategies in agro-industry, technology change and transfer, as well as agro-industry technology strategies.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*1. Frankel, E,G. 1990. Management of Technological Change: The Great Chalange of Management to the Future. Dordrectit, Kluwer Academic Publ.* *2. Gumbira – Said, Racmayanti dan Zahrul Muttaqin, 2001. Manajemen Teknologi , Ghalia Indonesia.* *3. Sharif, N. 1993. Rationale and The Framework for Tecnology Management Information system. Volume 1. LIPI – Jakarta.* *4. Steele,L. W. 1988. Managing Tecnology : The Strategic View. New York, Mc Graw – Hill Book Comp.* 5. *Tjakraatmadja, R.L. 1997. Manajemen Teknologi, Bandung, Studio Manajemen Teknik Industri, ITB* 6. *Twiss, B, C. 1992. Managing Technological Innovation, London, Pitman Publik.*

11. Industrial Ecology

Module designation	*Industrial Ecology*
Semester(s) in which the module is taught	*Elective*
Person responsible for the module	*Dr. Ir. Daniel Useng, M.Eng.Sc* *Diyah Yumeina RD, STP., M.Agr., Ph.D*
Language	*Indonesia*
Relation to curriculum	*Elective*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Renewable Energy* *Electricity and Agricultural Electrification* *Water Resources Management* *Agro-industry Management*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)*
Content	*Students can understand and master ecological principles and apply ecological principles in relations between industries such as industrial symbiosis, and life cycle analysis principles, students also understand the concepts of material flow and energy flow analysis, zero emissions, sustainable development, and the basics basis of environmental impact analysis.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*Main Textbook:* *1. Ayres & Ayres 2002. A Handbook of Industrial Ecology. E.Elgars Publ. Northampton, pp 680.* *2. Xiaohong Li, 2018. Industrial Ecology and Industry Symbiosis's for Environmental Sustainability: Delnitions, Frameworks and Applications. Palgape, MacMillan. Pp 144.* *Supporting Textbooks:* *1. Adoue. C., 2011. Implementing Industrial Ecology: Methodological Tools and Reflections for Constructing a Sustainable Development. CRC, Taylor & Francis. Madison. Pp 157.* *2. Suh. S. (ed), 2009. Handbook of Input-Output Economics in Industrial Ecology. Springer.*

12. Design and Testing

Module designation	*Design and Testing*
Semester(s) in which the module is taught	*Elective*
Person responsible for the module	*Prof Dr. Ir. Junaedi Muhidong, M.Sc* *Dr. Ir. Abdul Waris, MT* *Dr. Iqbal, STP., M.Si*
Language	*Indonesia*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Engineering Mechanics* *Engineering Materials Knowledge* *Engineering Drawing* *Engineering Drawing Practicum*
Module objectives/intended learning outcomes	*ELO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields.* *ELO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession* *ELO 5: Use techniques, skills, and modem tools necessary for agricultural engineering practices.*
Content	*The course is designed to provide students with knowledge and skills in engineering design which they can apply in designing simple agricultural tools and equipment. This course discusses concepts, principles and procedures in engineering design and basic calculations for dimensions of machine element.*
Examination forms	*Writing and essay, etc.*
Study and examination requirements	*Attendance Above 80%*
Reading list	*Harsokoesoemo, H.D., 2004, Pengantar PerancanganTeknik (Perancangan Produk), Bandung, ITB press*

13. Food Processing Engineering II

Module designation	*Food Processing Engineering II*
Semester(s) in which the module is taught	*Elective*
Person responsible for the module	*Dr. Ir. Supratomo, DEA* *Prof. Dr. Ir. Salengke, M.Sc* *Prof. Dr. Ir. Mursalim*
Language	*Indonesia*
Relation to curriculum	*Elective*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel Study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation= 8.5 hours*
Credit points	*2 SKS = 3.4 ECTS*
Required and recommended prerequisites for joining the module	*Biology* *Thermodynamics* *Heat Transfer* *Food Processing Engineering I*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 7: Manage and utilize agricultural resources effectively, efficiently, and sustainably; (Competence 1)* *ILO 8: Demonstrate capacity in operating agricultural engineering related business either as producer or service provider; (Competence 2)*
Content	*The purpose of this course is to provide students with knowledge and analytical and problem-solving skills necessary to analyze processes applied in food processing operations. Topics that will be covered in this course include the concepts and principles applied in food engineering, mass and energy balances, fluid flows, psychometric chart, heat and mass transfer, drying, evaporation, refrigeration, and food freezing.*
Examination forms	*Writing exam*
Study and examination requirements	*Attendance above 80%*
Reading list	*Singh, R. P. and Dennis R. Heldman. 2009. Introduction to Food Engineering 4th ed. Academic Press. San Diego.*

14. Agricultural Product Processing Engineering II

Module designation	*Agricultural Product Processing Engineering II*
Semester(s) in which the module is taught	*Elective*
Person responsible for the module	*Dr. Ir. Supratomo, DEA* *Prof. Dr. Ir. Salengke, M.Sc* *Prof. Dr. Ir. Mursalim*
Language	*Indonesia*
Relation to curriculum	*Elective*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* *2 SKS x 1.7 = 3.4 ECTS = 91.8 hours* *> Lecture = 23.3 hours* *> Excercise = 28 hours* *> Sel study = 28 hours* *> Exam = 4 hours (MID term and final)* *> Exam preparation = 8.5 hours*
Credit points	*2 SKS =3.4 ECTS*
Required and recommended prerequisites for joining the module	*Food Processing Engineering* *Heat Transfer and Thermodynamics*
Module objectives/intended learning outcomes	*ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)* *ILO 4: Use quantitative analysis, information technology and critical thinking in agricultural engineering profession; (Knowledge 2)* *ILO 5: Use techniques, skills, and modern tools necessary for agricultural engineering practices; (Skill 1)* *ILO 7: Manage and utilise agricultural resources effectively, efficiently, and sustainably; (Competence 1)*
Content	*This course covers the principles of mechanical engineering, namely statics and dynamics, which form the foundation for designing agricultural tools and machinery. This course covers topics such as: dimensions and units, the International System of Units, rigid body statics, equilibrium concepts, center of mass and centroid, moment of inertia, kinematics of linear motion, dynamic principles, momentum and impulse, work and energy, kinematics of curved motion, projectile motion, and rotational kinematics.*
Examination forms	*Writing*
Study and examination requirements	*Attendance above 80%*
Reading list	*1. Tmoshenko, S and D.H. Young. Engineering Mechanics. Erlangga ,1990* *2. Ferdinand P. B; E.R. Jahuston and Liong, T.H. Mechanics for Engineers: Statics. 1976*