Module designation	TM201401-Introduction of Mechanical Engineering
Semester(s) in which the module is taught	1st
Person responsible for the module	Chaerul Qalbi AM, S.T., M.Sc.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 90.67 hours in one semester, which consist of: - 26.67 hours for lecture, - 32 hours for structured assignments, - 32 hours for private study
Credit points	2 CP (3.02 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 3. An ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4. An ability to apply Pancasila values, ethical and professional responsibilities **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO 1. Students are able to know the history, sub-fields, ethics and profession of mechanical engineering CLO 2. Students are able to know the scientific basis of mechanical design (style, structure, material, manufacturing process, engine transmission, fluid mechanics, energy and heat, Metallurgy and Mechanical Design)
Content	1. History of mechanical engineering 2. Sub-fields of mechanical engineering such as Energy Conversion, Manufacture, Metallurgy, and Mechanical Design 3. Ethics dan Profession of mechanical engineering 4. Scientific basics of mechanical design : force, structure, materials, manufacture process, machine transmission, fluid mechanics, energy and heat
Examination forms	1. Homework 30% 2. Quiz 20% 3. Mid semester exam 25% 4. Final Exam 25%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. J. Paulo Davim (2018)., “Introduction to Mechanical Engineering”, 1st Edition, Springer International Publishing. 2. Jonathan Wickert & Kemper Lewis (2016). "An Introduction to Mechanical Engineering", Third Edition, Global Engineering. 3. Michael Clifford, Richard Brooks, Alan Howe, Andrew Kennedy, Stewart McWilliam, Stephen Pickering, Paul Shayler and Philip Shipway (2009). “An introduction to Mechanical Engineering. Part 1”, Hodder Education. 4. Michael Clifford, Richard Brooks, Kwing-So Choi, Donald Giddings, Alan Howe, Thomas Hyde, Arthur Jones, and Edward Williams (2010). “An introduction to Mechanical Engineering. Part 2”, Hodder Education.

Module designation	TM201402-Engineering Drawing
Semester(s) in which the module is taught	1st
Person responsible for the module	Faisal Manta, S.T., M.T.,
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO 1. Students are able to draw projections according to ISO standards CLO 2. Students are able to read projection images according to ISO standards CLO 3. Students are able to give symbols, dimensions and tolerances to engineering drawings according to ISO standards
Content	1. Principles of drawing 2. Drawing tools 3. Line type 4. Geometry synthesis 5. Projection 6. Sketch drawing 7. Custom projection and Cutout drawing 8. Auxiliary views and cuts 9. Dimensions, tolerances, workmanship file
Examination forms	1. Homework 30% 2. Quiz 20% 3. Mid semester exam 25% 4. Final Exam 25%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Anonymous (2002). Technical Drawing: ISO Standard Hand Book volume 12 2. Ir. Ohan Juhana, M Suratman S.Pd. (2000). Menggambar Teknik Mesin Menurut Standar ISO: Pustaka Grafika 3. Sato, Takeshi G., dan N. Sugiharso., (1996). Menggambar Mesin Menurut Standar ISO: Pradnya Paramitha

Module designation	TM201403-Mechanical Drawing
Semester(s) in which the module is taught	2nd
Person responsible for the module	Faisal Manta, S.T., M.T.,
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	Engineering Drawings with a minimum value of D
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology CLO 1. Students are able to design part designs on CAD computer programs CLO 2. Students are able to run assembly on CAD computer programs CLO 3. Students are able to apply ISO drawing standards
Content	1. Program introduction 2. Basic 3D drawing techniques 3. Assembly 4. Layout 2D drawing 3D configuration 5. Toolbox 6. Animation Assembly 7. Simulation Lay out
Examination forms	1. Homework 30% 2. Quiz 20% 3. Mid semester exam 25% 4. Final Exam 25%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Anonim (2002). Technical Drawing: ISO Standard Hand Book volume 12 2. Sato, Takeshi G., dan N. Sugiharso H., (1996). Menggambar Mesin Menurut Standar ISO: Pradnya Paramitha 3. Frederick E., (2016). Technical Drawing with Engineering Graphics: Prentice Hall, New York

Module designation	TM201404-Engineering Statics
Semester(s) in which the module is taught	2nd
Person responsible for the module	Illa Rizianiza, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO 1. Students are able to explain and calculate the concept of force / load in cases in mechanical engineering CLO 2. Students are able to explain and calculate the concept of voltage caused by force in cases in mechanical engineering CLO 3. Students are able to analyze the concept of style balance CLO 4. Able to calculate the inertia and center of gravity of complex objects CLO 5. Students are able to analyze the static balance of complex structures
Content	1. Newton's laws and the concept of free body diagrams 2. Types of support 3. Certain Static Structure 4. Distribution and centralized load 5. Internal style 6. Friction 7. Pseudo-work method 8. Moment of inertia
Examination forms	1. Homework 30% 2. Quiz 20% 3. Mid semester exam 25% 4. Final Exam 25%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Meriam, Statika Jilid 1 Edisi Kedua 2. Russel C. Hibbeler, Engineering Mechanics: Statics, 12th edition, Prentice Hall 3. Sidharta S. Kamarwan, Statika Edisi Kedua, 1995 4. F. P. Beer and E. R. Johnston Jr., Vector Mechanics for Engineers: Statics, SI Metric Edition, 9th Edition, McGraw-Hill,

Module designation	TM201405-Thermodynamics I
Semester(s) in which the module is taught	3rd
Person responsible for the module	Doddy Suanggana, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO 1. Students are able to know the basic concepts of thermodynamics and its properties CLO 2. Students are able to know the energy and the first laws of thermodynamics and analyze in closed and open systems CLO 3. Students are able to know and calculate the application of the second law of thermodynamics, entropy to thermodynamic systems.
Content	1. Thermodynamics system 2. First law of thermodynamics 3. Properties and degree of state 4. Ideal gas model, incompressible substance 5. Control volume energy analysis
Examination forms	1. Homework 20% 2. Quiz 25% 3. Mid semester exam 25% 4. Final Exam 30%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Cengel, Yunus A. & Boles, Michael A., Kanoglu, Mehmet (2019). Thermodynamics ; an engineering approach, 9 th Edition, New York : McGraw-Hill Pustaka Pendukung 2. Effendy Arif (2012). Thermodinamika Teknik, Makassar : Membumi Publishing 3. Holman J. P (1985). Thermodynamics, 4 th Edition, New York : McGraw-Hill 4. Spalding D. B. & Cole E.II (1973). Engineering Thermodynamics, 3th Edition, London : Edward Arnold ltd

Module designation	TM201406-Engineering Mathematics
Semester(s) in which the module is taught	3rd
Person responsible for the module	Illa Rizianiza, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives CLO 1. Students are able to model and solve linear equations CLO 2. Students are able to solve vector problems CLO 3. Students are able to solve vector problems CLO 4. Students are able to complete the series
Content	1. Ordinary Differential Equation 2. Partial Differential Equation 3. Legendre's Equation 4. Bessel's Equation 5. Laplace Transform 6. Differential Operators 7. Fourier Series 8. Taylor Series 9. Matrix and Determinants
Examination forms	1. Homework 20% 2. Quiz 25% 3. Mid semester exam 25% 4. Final Exam 30%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Erwin Kreyzig. (2011). Advanced Engineering Mathematics. United Stated of America : John Wiley & Sons. 2. Wilfred Kaplan. (2002). Advanced Calculus 5st Edition, China : Pearson Addison .

Module designation	TM201407-Statistics and Probability
Semester(s) in which the module is taught	3rd
Person responsible for the module	Diniar Mungil Kurniawati, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 90.67 hours in one semester, which consist of: - 26.67 hours for lecture, - 32 hours for structured assignments, - 32 hours for private study
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO 1. Students are able to explain the role of statistics in engineering CLO 2. Students are able to complete statistically simple data processing CLO 3. Students are able to solve probability problems CLO 4. Students are able to solve probablitas distribution problems CLO 5. Students are able to solve sampling problems CLO 6. Students are able to calculate estimates CLO 7. Students are able to calculate hypothesis tests CLO 8. Students are able to solve regression problems
Content	1. The concepts of probability and joint probability. 2. Conditional probability. 3. Discrete random variables. 4. Continuous random variable. 5. Data representation. 6. Descriptive statistics. 7. Estimation (One sample). 8. Hypothesis testing (One sample). 9. Hypothesis testing (One sample). 10. Estimation and two-sample hypothesis. 11. Paired data and correlation. 12. Regression and ANOVA
Examination forms	1. Homework 25% 2. Quiz 20% 3. Mid semester exam 25% 4. Final Exam 30%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. David S Moore, George P McCabe, Bruce A Craig. (2016). Introduction to the Practice of Statistics. New York : W. H. Freeman and Co.

Module designation	TM201408-Strength of Materials
Semester(s) in which the module is taught	3rd
Person responsible for the module	Chaerul Qalbi AM, S.T., M.Sc.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 181.33 hours in one semester, which consist of: - 53.33 hours for lecture, - 64 hours for structured assignments, - 64 hours for private study
Credit points	4 credit points (equivalent with 6.04 ECTS)
Required and recommended prerequisites for joining the module	Engineering Statics
Module objectives/intended learning outcomes	**Attitude** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO 1. Students are able to know the basic concepts of stress, strain, deflection, and buckling. CLO 2. Students are able to analyze deflection, stress, and strain as the basis for designing the strength, stiffness, and stability of a beam.
Content	1. Stress and strain 2. Mechanical properties of material 3. Stress 4. Deflection 5. Mohr's circle 6. Failure theory
Examination forms	1. Homework pre mid semester exam 10% 2. Quiz 1 pre mid semester exam 17.5% 3. Mid semester exam 20% 4. Homework post mid semester exam 10% 5. Quiz 2 17.5 6. Final Exam 25%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Russel C. Hibbeler, Mechanics of Materials, 8th edition, Prentice Hall 2. F. P. Beer and E. R. Johnston Jr., Mechanics of Materials, 6th Edition, McGraw-Hill 3. J. M. Gere and B. J. Goodno (2012), Mechanics of Materials Brief, SI Edition, Cencage Learning

Module designation	TM201409-Engineering Materials I
Semester(s) in which the module is taught	3rd
Person responsible for the module	Andi Idhil Ismail, S.T., M.Sc., Ph.D.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO 1. Explain the structure and properties of materials. CLO 2. Understand phase diagram, heat treatment and strengthening mechanism of materials. CLO 3. Classify Steels and alloys according to their class and differentiate different type of materials base on their strength and weakness.
Content	1. Material Type and Application 2. Mechanical Properties and Examiners 3. The nature of the technology 4. Atomic theory, crystal defects, crystallography and dislocation 5. Phase diagram 6. Steel and Alloy 7. Heat Treatment 8. Alloy 9. Code and Standard
Examination forms	1. Homework 15% 2. Quiz 25% 3. Mid semester exam 30% 4. Final Exam 30%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Kalpakjian (2006), Manufacturing Engineering and Technology : 6th Ed., Digital Designs 2. Flinn & Trojan (1995), Engineering Materials and Their Applications : John Wiley & Sons, Inc. 3. James A. Jacobs & Thomas F. Kilduff (2004), Engineering Material Technology: Prentice- Hall, Inc.

Module designation	TM201410-Engineering Measurements
Semester(s) in which the module is taught	3rd
Person responsible for the module	Andre Amba Matarru, ST., M.Han
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	Calculus 1 and 2, Basic physics 1 and 2, Statistics
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO 1. Students are able to know measurement techniques and Digital Techniques in Measurement CLO 2. Students are able to understand data processing CLO 3. Students are able to apply Measurement Techniques (Displacement / Position, Strain and Voltage; Force and Torque; Pressure; Flow; Temperature; Movement; Special Topics)
Content	1. Introduction to measurement technique 2. Digital Techniques in Measurement 3. Data Processing 4. Displacement/Position Measurement 5. Strain and Stress Measurement 6. Force and Torque Measurement 7. Pressure Measurement 8. Flow Measurement 9. Temperature Measurement 10. Movement Measurement
Examination forms	1. Homework 10% 2. Quiz 25% 3. Mid semester exam 30% 4. Final Exam 35%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Holman, J.P. (2012). Experimental methods for engineers. New York: Mcgraw-Hill. 2. Northrop, R.B. (2014). Introduction to instrumentation and measurements. Boca Raton: Crc Press, Taylor & Francis Group. 3. Wheeler, A.J. and Ganji, A.R. (2010). Introduction to engineering experimentation. Boston: Prentice Hall. 4. Beckwith, T.G. and Marangoni, R.D. (2009). Mechanical measurements. Upper Saddle River, New Jersey: Pearson Prentice Hall. 5. Figliola, R.S. and Beasley, D.E. (2019). Theory and design for mechanical measurements. Hoboken, Nj: Wiley.

Module designation	TM201411-Fluid Mechanics I
Semester(s) in which the module is taught	3rd
Person responsible for the module	Gad Gunawan, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	Basic Physics I and II
Module objectives/intended learning outcomes	**Attitude :** ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO 1. Students are able to describe the basic concepts of Fluid Mechanics CLO 2. Students are able to analyze fluid static cases CLO 3. Students are able to understand the basic equations for control volume in an integral form CLO 4. Students are able to apply dimensional analysis and likeness
Content	1. Fluid properties 2. Continuum concept 3. Fluid statics (pressure and its measurement, forces, fluid in a rigid container in motion) 4. Fluid dynamics (fluid kinematics, stagnation and dynamic pressure, differential analysis, control volume) 5. Fundamental laws of fluid flow (euler, bernoulli, cauchy, navier stokes, reynolds theorem, energy press) 6. Dimensional analysis (pi-Buckingham theorem, tuna dimensions and similarity parameters)
Examination forms	1. Homework 10% 2. Quiz 20% 3. Mid semester exam 35% 4. Final Exam 35%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Robert W. Fox, Alan T. McDonald, and P. J. Pritchard (2004). “Introduction to Fluid Mechanics", Sixth Edition, New York : John Wiley & Sons Inc. 2. Bruce R. Munson, Donald F. Young, and Theodore H. Okiishi (1998). “Fundamentals of Fluid Mechanics”, Third edition, New York : John Wiley & Sons Inc.

Module designation	TM201412-Machine Element I
Semester(s) in which the module is taught	4th
Person responsible for the module	Faisal Manta, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	1. Strength of Materials 2. Engineering Material
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO 1. Students are able to understand the basis of loading and safety factors CLO 2. Students are able to evaluate a wide variety of engine elements (joints, shafts and pegs, clutches, brakes, and springs) CLO 3. Students are able to design engine elements in a particular case (joints, shafts and pegs, clutches, brakes, and springs)
Content	1. How machine elements work 2. Stress analysis and design process 3. Process design 4. Types of joint 5. Bearing 6. Spring
Examination forms	1. Homework 30% 2. Quiz 20% 3. Mid semester exam 25% 4. Final Exam 25%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Khurmi RS & Gupta JK (1980). A Text Book of Machine Design, Eurasia Publishing House Ltd, New Delhi, 2. Shigley's, Mechanical Engineering Design, Tenth Edition, Mc Graw Hill Education, 3. Paul H. Black (1968). Machine Design, New York : Mc Graw-Hill, 4. Stolk J &Kros C (1981). ElemenMesin (Terjemahan Hendarsin), Jakarta : Erlangga 5. Sularso (1978), Dasar Perencanaan dan Pemilihan Elemen Mesin, Jakarta : Pradnya Paramita

Module designation	TM201413-Heat and Mass Transfer I
Semester(s) in which the module is taught	4th
Person responsible for the module	Diniar Mungil Kurniawati, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO 1. Students are able to lay out the basis of heat transfer and conduction CLO 2. Students are able to explain 1-D and 2-D steady conduction CLO 3. Students are able to analyze 2-D steady conduction and understand the concept of transient conduction
Content	1. Concept of Heat and Mass Transfer 2. Thermal Properties of Material 3. Steady state conduction 4. Transient conduction
Examination forms	1. Homework 15% 2. Quiz 25% 3. Mid semester exam 30% 4. Final Exam 30%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Cengel, Y. A & Ghajar A. J (2011), Heat and Mass Transfer: Fundamentals and Aplications, 4 th Ed, New York : MC Graw-Hill 2. Lienhard IV , John H., and Lienhard V, Jhon H., A (2001), Heat Transfer Textbook , 3th Ed, USA : Phlogiston Press Cambridge 3. Kreith, F.; Boehm, R.F.; et. Al (1999), Heat and Massa Transfer. CRC Press LLC 4. Bejan, Adrian., Kraus, Allan D (2003), Heat Transfer Handbook, New Jersey : Jhon Wiley & Sons

Module designation	TM201414-Engineering Materials II
Semester(s) in which the module is taught	4th
Person responsible for the module	Andi Idhil Ismail, S.T., M.Sc., Ph.D.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 26.67 hours for lecture, - 32 hours for structured assignments, - 32 hours for private study, - 45.33 hours of laboratory practice
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	Engineering Materials I
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO 1. Students are able to explain the characteristics of metallic and non-metallic materials CLO 2. Students are able to carry out the heat treatment process and analyze the microstructure that occurs CLO 3. Students are able to demonstrate material testing methods and carry out tests of mechanical properties and analyze test data both individually and in groups CLO 4. Students know the material selection process by considering the characteristics, the material production process
Content	1. Dislocation, Slip, twinning, yield phenomena 2. Metal Reinforcement Method 3. Deformation 4. Fatigue 5. Metal Etching
Examination forms	1. Homework 5% 2. Quiz 25% 3. Mid semester exam 35% 4. Final Exam 35%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Suherman Wahid (2003) Ilmu Logam I, Jurusan Teknik Mesin FTI ITS, Surabaya, 2. Avner, Sidney H (1982). Introduction to Physical Metallurgy, Second Edition, McDraw-Hill International Booj Company, Tokyo, 3. Callister, William D. Jr (2007), Material Science and Engineering, John Wiley & Sins Inc., New York, 4. Saptono Rahmat (2008), Logam dan Paduan Berbasis Besi, Jurusan metalurgi dan material, Universitas Indonesia.

Module designation	TM201415-Fluid Mechanics II
Semester(s) in which the module is taught	4th
Person responsible for the module	Gad Gunawan, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 26.67 hours for lecture, - 32 hours for structured assignments, - 32 hours for private study, - 45.33 hours of laboratory practice
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	Fluid Mechanics I
Module objectives/intended learning outcomes	**Attitude :** ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO 1. Students are able to explain differential analysis on fluid movements CLO 2. Students are able to understand the internal flow of compressive viscous CLO 3. Students are able to understand the external flow of compressive viscous CLO 4. Students are able to understand compressible flow
Content	1. Viscous fluid flow in the channel (laminar, turbulent, fully develop, Moody diagram, minor loss and major loss) 2. External Flow (characteristics, lift and drag, boundary layer) 3. Ideal fluid flow 4. Compressible flow (ideal gas, mach number and speed of sound, isentropic and non-isentropic flow) 5. Lab
Examination forms	1. Homework 15% 2. Quiz 20% 3. Laboratorium practice 10% 4. Mid semester exam 25% 5. Final Exam 30%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Robert W. Fox, and Alan T. McDonald (1998), “Introduction to Fluid Mechanics”, Fifth Edition, New York : John Wiley & Sons Inc. 2. Irving H. Shames (1992), “Mechanics of Fluids”, Third Edition, New York : McGraw-Hill Inc., ,.Sixth Edition, New York : John Wiley & Sons Inc

Module designation	TM201416-Kinematics of Mechanism
Semester(s) in which the module is taught	4th
Person responsible for the module	Alfian Djafar, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 90.67 hours in one semester, which consist of: - 26.67 hours for lecture, - 32 hours for structured assignments, - 32 hours for private study
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	Engineering Statics
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO 1. Students are able to analyze the speed of a mechanism using the graphical method. CLO 2. Students are able to analyze the speed of a mechanism using the analytical method. CLO 3. Students are able to analyze the acceleration of a mechanism using the graphical method.
Content	1. Pole point momentary velocity 2. Simple mechanism 3. Velocity and acceleration analysis 4. Helping point method 5. Rolling phenomenon 6. Equivalent mechanism
Examination forms	1. Homework 15% 2. Quiz 1 17.5% 3. Quiz 2 17.5% 4. Mid semester exam 25% 5. Final Exam 25%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. George Martin (1982), “Kinematics and Dynaics of Machine Second Martin”,McGraw-Hill 2. J.S. Rao (2011), “Kinematics of Machinery Through Hyperworks”, Springer 3. Holowenko (1992), “Dinamika Permesinan”, Erlangga. 4. Norton, Robert L. (2004), “Design of Machinery”, 3rd edition, New York : McGraw-Hill 5. Waldron, Kenneth L., and G.L. Kinzel (1999), “Kinematics, Dynamics, and Design of Machinery”, New York : John Wiley & Sons, 6. Holowenko, A.R. (1995), “Dynamics of Machinery”, New York : John Wiley & Sons 7. Kimbrell, Jack T. (1991), “Kinematics Analysis and Synthesis, New York : John Wiley & Sons

Module designation	TM201417 Thermodynamics II
Semester(s) in which the module is taught	4th
Person responsible for the module	Doddy Suanggana, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study.
Credit points	3 CP (4,53 ECTS)
Required and recommended prerequisites for joining the module	Thermodynamics I
Module objectives/intended learning outcomes	**Attitude :** ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO 1. Students are able to calculate, analyze thermal efficiency gas power cycle CLO 2. Students are able to calculate, analyze the thermal efficiency of vapor cycles
Content	1. Entropy and the Second Law of Thermodynamics. 2. Standard air power cycle (Carnot Cycle, Otto Cycle, Diesel Cycle, Combined Cycle, Brayton Cycle and Jet Propulsion Cycle). 3. Vapor Cycle (Rankien Cycle, Vapor Compression Refrigeration Cycle). 4. Unreacted Mixture (Psycometric). 5. Mixture reacts (combustion).
Examination forms	1. Homework 25% 2. Quiz 20% 3. Mid semester exam 25% 4. Final Exam 30%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Effendy Arif (2012), Thermodinamika Teknik, Makassar : Membumi Publishing , 2. Holman J. P.(1985) , Thermodynamics, 4 th Edition, McGraw-Hil 3. Reynolds W.C. & Perkins H.C (1983), Engineering Thermodynamics, 2 nd Edition, McGraw-Hill 4. Spalding D. B. & Cole E.II (1973), Engineering Thermodynamics, 3th Edition, London : Edward Arnold ltd

Module designation	TM201418 Heat and Mass Transfer II
Semester(s) in which the module is taught	5th
Person responsible for the module	Diniar Mungil Kurniawati, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 90,67 hours in one semester, which consist of: - 26,67 hours for lecture, - 32 hours for structured assignments - 32 hours for private study - 45,33 hours for practice
Credit points	3 CP (4,53 ECTS)
Required and recommended prerequisites for joining the module	Thermodynamics I and II, Heat and Mass Transfer I
Module objectives/intended learning outcomes	**Attitude :** ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO 1. Students are able to explain the concepts and mechanisms of convection CLO 2. Students are able to apply the empiric formula of external forced convection CLO 3. Students are able to explain about natural convection CLO 4. Students are able to explain the transfer of heat by radiation CLO 5. Students are able to explain mass displacement by diffusion
Content	1. Fundamentals of convection (similarity, general equations) 2. Fundamentals of mass transfer 3. Forced convection of external flow (flat plate, cylinder, sphere, bundled tube) 4. Inner flow forced convection (cylindrical, non-cylindrical) 5. Heat exchangers (LMTD and NTU-e) 6. Free convection and combination 7. Radiation (black body, Wien's law, radiation characteristics, Kirchoff, form factor) 8. Lab
Examination forms	1. Homework 20% 2. Quiz 15% 3. Mid semester exam 30% 4. Final Exam 35%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1.Incropera, Frank P., and David P. De Witt (2001), " Fundamental of Heat and Mass Transfer", 6th ed, New York : John Wiley and Sons 2. Holman, J.P.,(2002) "Heat Transfer", 9th Ed, New York : Mc Graw-Hill Inc 3. Cengel, Y.A. (1998), " Heat Transfer", McGraw-Hill 4. Adrian Bejan (1993), " Heat Transfer", New York : John Wiley and Sons

Module designation	TM201419 Dynamic and Control Systems
Semester(s) in which the module is taught	5th
Person responsible for the module	Illa Rizianiza, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments - 48 hours for private study
Credit points	3 CP (4,53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO 1. Students are able to model dynamic systems in the time domain CLO 2. Students are able to model dynamic systems in the frequency domain CLO 3. Able to design PID controllers at a plant CLO 4. Able to simulate control systems in Matlab software CLO 5. Able to explain stability analysis
Content	1. Laplace Transform 2. System dynamic modeling includes mechanical, electrical, thermal, fluid, mechanical-electrical systems 3. Basic control system 4. PID control design 5. Compensation system on control system 6. Analysis of system stability in the time domain 7. Root locus 8. Digital control system
Examination forms	1. Homework 10% 2. Quiz 20% 3. Simulation task 15% 4. Mid semester exam 25% 5. Final Exam 30%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1.Katsuhiko Ogata. (2010). Modern Control Engineering. New Delhi : Prentice Hall Inc. 2. Norman S Nise. (2011). Control System Engineering 4th edition. United State of America : Jhon Wiley & Sons Inc. 3. Robert N Bateson. (2001). Introduction to Control System Technology. New Jersey : Prentice Hall.

Module designation	TM201420 Machine Elements II
Semester(s) in which the module is taught	5th
Person responsible for the module	Faisal Manta , S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments - 48 hours for private study
Credit points	3 CP (4,53 ECTS)
Required and recommended prerequisites for joining the module	Machine Element I
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts Engineering Skills ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO 1. Students are able to know the basic concepts of transmission systems and components (chain-sprocket, belt-pulley, and gears). CLO 2. Students are able to evaluate the basic concepts of transmission systems and components (chain-sprocket, belt-pulley, and gears). CLO 3. Students are able to design basic concepts of transmission systems and components (chain-sprocket, belt-pulley, and gears)
Content	1. Transmission 2. Friction clutch & clutch 3. Friction disk 4. Gears & pulleys 5. Lubrication 6. Standards and codes
Examination forms	1. Homework 30% 2. Quiz 20% 5. Mid semester exam 25% 6. Final Exam 25%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Katsuhiko Ogata. (2010). Modern Control Engineering. New Delhi : Prentice Hall Inc. 2. Norman S Nise. (2011). Control System Engineering 4th edition. United State of America : Jhon Wiley & Sons Inc. 3. Robert N Bateson. (2001). Introduction to Control System Technology. New Jersey : Prentice Hall.

Module designation	TM201421 Manufacturing Processes I
Semester(s) in which the module is taught	5th
Person responsible for the module	Hadhimas Dwi Haryono, S.T., M.Eng.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 90,67 hours in one semester, which consist of: 1. 26,67 hours for lecture, 2. 32 hours for structured assignments 3. 32 hours for private study 4. 45,33 hours for practice
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Engineering Skills :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology CLO 1. Students are able to describe the basic concepts of manufacturing processes and their types. CLO 2. Students are able to determine and analyze various manufacturing processes in making products. CLO 3. Students are able to design Metal Product Production Process Based on Machining, Forming, and Powder Metalllurgy Process
Content	1. Machining process: lathe, milling, grinding and drilling process. 2. Forming process: bending, forging, rolling, drawing, extrusion and sheet metal forming process. 3. Manufacture of products with powder metallurgy process.
Examination forms	1. Homework 10% 2. Quiz 25% 3. Mid semester exam 30% 4 . Final Exam 35%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Kalpakjian, Serope and Schmid, Steven R., (2014). “Manufacturing Engineering and Technology”, 7th Ed, Prentice Hall. 2. Groover, Mikell P, (2013). “Fundamentals of Modern Manufacturing: Materials, Processes, and Systems”, 5th Ed, Wiley. 3. Kalpakjian, Serope and Schmid, Steven R., (2008). “Manufacturing Processes for Engineering Materials”, 5th Ed, Prentice Hall. 4. Schey, John A., (2000). “Introduction to Manufacturing Processes”, 3rd Ed, Mc Graw-Hill. 5. E. Paul DeGarmo, J T. Black, Ronald A. Kohser., (2008). “Materials and Processes in Manufacturing”, 10th Ed, Wiley.

Module designation	TM201422 Numerical Methods
Semester(s) in which the module is taught	5th
Person responsible for the module	Doddy Suanggana, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments - 48 hours for private study
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives CLO 1. Students are able to understand and calculate linear and non-linear equations CLO 2. Students are able to calculate interpolation and regression numerically CLO 3. Students are able to calculate integration numerically
Content	1. Error analysis: measurement, source and propagation of errors 2. Ordinary differential equation 3. Partial differential equation 4. Linear equation 5. Non-linear equation 6. Interpolation 7. Regression 8. Integration
Examination forms	1. Homework 20% 2. Quiz 25% 3. Mid semester exam 25% 4. Final Exam 30%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Steven C. Chapra, Raymond. P. Chanale. (2015). Numerical Methods for Engineers. New York : McGraw-Hill Education.

Module designation	TM201423 Engineering Dynamics
Semester(s) in which the module is taught	5th
Person responsible for the module	Alfian Djafar, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments - 48 hours for private study
Credit points	3 CP (4,53 ECTS)
Required and recommended prerequisites for joining the module	Kinematics of Mechanism
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skills :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology CLO 1. Students are able to analyze forces as static force and inertia force in mechanism CLO 2. Students are able to analyze practical problems of mechanical engineering in the form of balancing using graphical methods and analytical methods
Content	1. Static force analysis on mechanism 2. D'Alembert Principle 3. The inertial force on mechanism 4. Dynamic Analysis 5. Balancing for rotating mass and reciprocating mass 6. Gyroscope 7. Flywheel
Examination forms	1. Homework 15% 2. Quiz 35% 3. Mid semester exam 25% 4. Final Exam 25%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Holowenko(1992), “Dinamika Permesinan”, Erlangga 2. George Martin (1982), “Kinematics and Dynaics of Machine Second Martin”,McGraw-Hill 3. Dan B. Marghitu (2005), “Kinematic Chains and Machine Components Design”, Elsevier

Module designation	TM201424 Mechanical Design
Semester(s) in which the module is taught	6th
Person responsible for the module	Faisal Manta, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (ILC), group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry), Project Base Learning.
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 90,67 hours in one semester, which consist of: - 26,67 hours for lecture, - 32 hours for structured assignments - 32 hours for private study
Credit points	2 CP (3.02 ECTS)
Required and recommended prerequisites for joining the module	Engineering Design with D as minimal score
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, ILO 5. an ability to perform life-long learning and apply new knowledge as needed using appropriate learning strategies. **Engineering Skills :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology CLO 1. Students are able to measure /estimate the workload of a mechanical system CLO 2. Students are able to calculate machine elements in mechanical systems CLO 3. Students are able to create work drawings / tool designs as needed CLO 4. Students are able to design and execute manufacturing designs
Content	1. Program introduction 2. Basic 3D drawing techniques 3. Assembly 4. 2D Layout drawing 3D configuration 5. Toolbox 6. Animation Assembly 7. Layout Simulation
Examination forms	1. Attitude 20% 2. Engineering drawing 20% 3. Load Force Analyis 20 % 4. Machine Elements Calculation 20% 5. Report writing 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Shigley, Joseph E (2001). Mechanical Engineering Design, 5th Edition, New York : McGraw Hill 2. Khurmi, RS, JK Gupta (2005). Machine Design. Eurasia Publishing House (PVT.) LTD

Module designation	TM201425 Finite Element Method
Semester(s) in which the module is taught	6th
Person responsible for the module	Andi Idhil Ismail, S.T., M.Sc., Ph.D.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 32 hours for structured assignments - 48 hours for private study
Credit points	3 CP (4,53 ECTS)
Required and recommended prerequisites for joining the module	Numerical Methods
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skills :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO 1. Learn the fundamental principles and practical techniques of the Finite Element Method (FEM). CLO 2. Develop practical experience with industry standard Finite Element Analysis (FEA) software packages such as ABAQUS or ANSYS. CLO 3. Deliver effective communication and present design ideas.
Content	1. Introduction and concept 2. Mathematical concepts 3. Stress-strain analysis and design criteria 4. Uniaxial rod and truss 5. Beam and plane 6. 3D solid objects 7. Modeling and analytical procedures 8. Design optimization
Examination forms	1. Homework 10% 2. Quiz 25% 3. Mid semester exam 30% 4. Final Exam 35%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Bathe, K.-J. (2014). Finite Element Procedures. S.L.: S.N. 2. Liu, G.R. and Quek, S.S. (2003). The finite element method : a practical course. Oxford ; Boston: Butterworth-Heinemann. 3. Saeed Moaveni (2020). Finite element analysis : theory and application with ANSYS. Hoboken, Nj: Pearson, Inc. 4. Robert Davis Cook (2003). Concepts and applications of finite element analysis. India: John Wiley & Sons (Asia. 5. Yang, T.Y. (1986). Finite element structural analysis. Englewood Cliffs, N.J.: Prentice-Hall. 6. https://academy.3ds.com/en/software/abaqus-student-edition

Module designation	TM201426 Energy Conversion Engineering
Semester(s) in which the module is taught	6th
Person responsible for the module	Doddy Suanggana, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 26.67 hours for lecture, - 32 hours for structured assignments, - 32 hours for private study, - 45.33 hours for laboratory practice
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	Thermodynamics II, Heat and Mass Transfer II
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Engineering Skills :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO 1. Students are able to classify energy on conventional and non-conventional energy conversion machines CLO 2. Students are able to know the working principles and analyze energy changes in conventional or non-renewable energy conversion engines CLO 3. Students are able to know the working principles and analyze energy transfer on non-conventional or renewable energy conversion engines
Content	2. External Combustion Engine 3. Machines – Fluid Machines 4. Cooling Machine 5. Thermal Pump 6. Non-Conventional Energy Conversion Machine
Examination forms	1. Homework 25% 2. Quiz 20% 3. Mid semester exam 25% 4. Final Exam 30%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Raja, A.K., Srivastava, Amit ., Dwivedi, Manish (2006). Power Plant Engineering, New Delhi : New Age International Publishers 2. Twidell, J., Weir, T. (2015). Renewable Energy Resources 3thedition, New York : Routledge 3. Whitman, B., Jhonson, B., Tomczyk, J., (2016). Refrigeration and Air Conditioning Technology 8thedition, USA : Cengage Learning 4. Carravetta, A., Hourch, S.D., Ramos, H., M. (2018). Pump as Tubines, Switzerland : Springer International Publishing

Module designation	TM201427 Manufacturing Processes II
Semester(s) in which the module is taught	6th
Person responsible for the module	Hadhimas Dwi Haryono, S.T., M.Eng.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 26.67 hours for lecture, - 32 hours for structured assignments, - 32 hours for private study, - 45.33 hours of laboratory practice
Credit points	3 CP (4,53 ECTS)
Required and recommended prerequisites for joining the module	Manufacturing Processes I
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Engineering Skills :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology CLO 1. Students are able to describe the basic concepts of manufacturing processes and their types. CLO 2. Students are able to determine and analyze various manufacturing processes in making products. CLO 3. Students are able to design Metal Product Production Process Based on Casting Process, Welding, Non-Traditional Machining, and Polymer Products.
Content	1. Non-conventional machining processes: Abrasive processes and Water Jet Machining (AJM and WJM), Electric Discharge Machining (EDM), Electrochemical Machining (ECM), Electrochemical Grinding (ECG), and Chemical Machining (CHM). 2. Welding process: Shield Metal Arc Welding (SMAW), Acetylene Gas Welding (AGW), Resistance Welding (RW), Brazing and Soldering (B&S), Tungsten Inert Gas (TIG), Submerge Arc Welding (SAW), Plasma Arc Welding (PAW). 3. Polymers and their manufacturing process: Extrusion, Injection and Blow molding. 4. Casting process: Sand Casting, Centrifugal Casting, Die Casting, and Continuous Casting
Examination forms	1. Homework 10% 2. Quiz 25% 3. Mid semester exam 30% 4. Final Exam 35%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Kalpakjian, Serope and Schmid, Steven R., (2014). “Manufacturing Engineering and Technology”, 7th Ed, Prentice Hall. 2. Groover, Mikell P, (2013). “Fundamentals of Modern Manufacturing: Materials, Processes, and Systems”, 5th Ed, Wiley. 3. Kalpakjian, Serope and Schmid, Steven R, (2008). “Manufacturing Processes for Engineering Materials”, 5th Ed, Prentice Hall. 4. Schey, John A., (2000). “Introduction to Manufacturing Processes”, 3rd Ed, Mc Graw-Hill, 5. E. Paul DeGarmo, J T. Black, Ronald A. Kohser., (2008). “Materials and Processes in Manufacturing”, 10th Ed, Wiley.

Module designation	TM201428 Mechatronics
Semester(s) in which the module is taught	6th
Person responsible for the module	Alfian Djafar, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry), Project Base Learning
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 90.67 hours in one semester, which consist of: - 26.67 hours for lecture, - 32 hours for structured assignments, - 32 hours for private study
Credit points	2 CP (3,02 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skills :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO 1. Students are able to explain the general concept of mechatronics CLO 2. Students are able to explain the main aspects of mechatronics CLO 3. Students are able to design mechatronic systems CLO 4. Students are able to explain traditional control systems CLO 5. Students are able to explain the latest control system CLO 6. Students are able to apply the latest control systems to the design of mechatronic systems
Content	1. Semiconductors, diodes, transistors, operational amplifiers 2. Number system 3. Binary mathematics 4. Boolean algebra 5. Analog and digital system 6. Data acquisition and conversion
Examination forms	1. Homework 15% 2. Practice 20% 3. Mid semester exam 25% 4. Final Task 40%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Godfrey, Onwuboolu, “Mechatronics, Principles and Aplications”, Elsevier 2. Robert H. Bishop (2002), The Mechatronics Handbook, CRC Pres 3. Annalisa Milella, dkk (2010). “Mechatronics System Applications”, InTech

Module designation	TM201429 Operations Management
Semester(s) in which the module is taught	7th
Person responsible for the module	Hadhimas Dwi Haryono, S.T., M.Eng.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study
Credit points	3 CP (4,53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, **Engineering Skills :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO 1. Students are able to describe basic concepts and methods in Operational Management CLO 2. Students are able to analyze the best type of management for the work operations of a manufacturing industry both in operation strategy, product design, factory layout to the reliability of an industry's operations. CLO 3. Students are able to design the management of the work operations of a manufacturing industry both in operating strategy, product design, factory layout to the reliability of an industry's operations.
Content	1. Introduction to production planning 2. Forecasting, Aggregate planning, Inventory Control 3. MRP, Squencing and Scheduling, Lean Manufacturing, Quality Management 4. Introduction of New Business Design, Operation Strategy & Competitiveness, Management Strategic & Supply Chain 5. Product Design; Process Design; Job design & Work Measurement 6. Plant Layout and Project Management
Examination forms	2. Quiz 1 20% 3. Quiz 2 20% 4. Mid semester exam 20% 5. Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Jay Heizer, Barry Render dan Chuck Munson, (2016). “Operations Management: Sustainability and Supply Chain Management”, 12th Edition, Pearson Education Limited. 2. Jay Heizer, Barry Render dan Chuck Munson, (2017). “Principles of operations management sustainability and supply chain management” 10th Edition, Pearson Education Limited. 3. Chase, Aquilano, and Jacobs, (2009). “Operations and Supply Management”, 12th Edition, Mc Graw Hill. 4. Stevenson, William J, (2018). “Operations Management” 13th edition, McGraw-Hill

Module designation	TM201430 Mechanical Vibration
Semester(s) in which the module is taught	7th
Person responsible for the module	Alfian Djafar, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 26.67 hours for lecture, - 32 hours for structured assignments, - 32 hours for private study, - 45.33 hours of laboratory practice
Credit points	3 CP (4,53 ECTS)
Required and recommended prerequisites for joining the module	Engineering Dynamics
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skills :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO 1. Students are able to model the vibration system CLO 2. Students are able to compose equations of motion of vibration systems CLO 3. Students are able to analyze solving problems in vibration cases
Content	1. Modeling 2. Energy Method 3. Single degree of freedom vibration (free and submerged) 4. Forced Vibration 5. Free Vibration two Degrees of Freedom 6. Practical Methods (Dukerley, Rayleigh)
Examination forms	1. Homework 15% 2. Quiz 35% 3. Mid semester exam 25% 4. Final Exam 25%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Rao, Singiresu S. (2011), “Mechanical Vibrations”, 5th Edition, Prentice Hall 2. Kelly, S. Graham (2011), “Mechanical Vibrations: Theory and Applications”, SI Edition, Cengage Learning 3. Timoshenko, S. (1990) , "Vibration Problems in Engineering", Fifth Edition, John Wiley & Sons, Inc 4. Leonard Meirovitch (1986), "Elements Of Vibration Analysis", International Edition, McGraw-Hill 5. Inman, D. J. (2008), “Engineering Vibration”, 3rd Edition, Pearson Prentice Hall

Module designation	TM201431 Electrical Power Engineering
Semester(s) in which the module is taught	7th
Person responsible for the module	Andre Amba Matarru, S.T., M.Han.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 26.67 hours for lecture, - 32 hours for structured assignments, - 32 hours for private study, - 45.33 hours of laboratory practice
Credit points	3 CP (4,53 ECTS)
Required and recommended prerequisites for joining the module	Physics I and II
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO 1. Students are able to find out the characteristics of motors and electric generators in accordance with operating conditions. CLO 2. Students are able to choose motors and electric generators according to operating conditions CLO 3. Students are able to know the control and maintenance of motors and electric generators in accordance with operating conditions.
Content	1. Introduction of power supplies and electrical loads 2. Basic electric and magnetic circuits, transformers 3. Basic electromechanical 4. Direct current machine, synchronous machine, induction machine 5. Working characteristics and their use 6. Selection, control, maintenance of motors and generators 7. Lab
Examination forms	1. Homework 30% 2. Quiz 20% 3. Mid semester exam 25% 4. Final Exam 25%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Zuhal (2000). ”Dasar Teknik Tenaga Listrik dan Elektronika Daya”, Jakarta : Penerbit Gramedia Pustaka Utama. 2. Wijaya, Mochtar (2001). Dasar-Dasar Mesin Listrik. Jakarta : Djambatan.

Module designation	KU201209 Calculus I
Semester(s) in which the module is taught	1st
Person responsible for the module	Nashrul Millah, S.Si., M.Si.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO 1. Students are able to explain the basic concepts of calculus and algebra in real number systems, functions, limit functions, derivatives and integrals CLO 2. Students are able to provide geometric interpretation and numerical calculation of real number systems, functions, limit functions, derivatives and integrals CLO 3. Students are able to solve simple problems in basic engineering by using derivative and integral concepts
Content	1. Real number system 2. Function and limit 3. Differential 4. Differential applications 5. Integration
Examination forms	1. Homework 5% 2. Quiz 10% 3. Case study (group discussion) 50% 4. Mid semester exam 15% 5. Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Varberg, D., Purcell, E., & Rigdon, S. (2007). *Calculus, Ninth Edition.* USA: Pearson, Prentice Hall Inc. 2. Anton, H., Bivens, I. C., & Davis, S. (2012). *Calculus Early Transcendentals 10th Edition.* USA: John Wiley & Sons, Inc. 3. Dosen-Dosen Jurusan Matematika ITS. (2012). *Buku Ajar Kalkulus 1.* Jurusan Matematika FMIPA ITS.

Module designation	KU201215 Basic Chemistry
Semester(s) in which the module is taught	1st
Person responsible for the module	Ashadi Sasongko, S.Si., M.Si
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO 1. Students are able to understand and explain the atomic structure, periodic table, stociometry and chemical reaction. CLO 2. Students are able to understand and explain the basic principles of chemical thermodynamics, chemical kinetics, and electrochemistry in chemical reaction.
Content	1. Modern chemical concepts 2. Chemical bond 3. Stoiciometry 4. Form of substances 5. Solvent 6. Chemical kinetics 7. Thermochemistry 8. Electrochemistry
Examination forms	1. Homework 5% 2. Quiz 10% 3. Case study (group discussion) 50% 4. Mid semester exam 15% 5. Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Petrucci, et. al. (2014). Kimia Dasar : Prinsip-prinsip & Aplikasi Modern. Jakarta: Erlangga. 2. Oxtoby, et. al. (2003). Prinsip-prinsip Kimia Modern. Jakarta: Erlangga. 3. Syukri, S. (2003). Kimia Dasar. Bandung: ITB Press. 4. Sastrohamidjojo, H. (2005). Kimia Dasar. Yogyakarta: UGM Press.

Module designation	KU201211 Physics I
Semester(s) in which the module is taught	1st
Person responsible for the module	Fadli Robiandi
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 26.67 hours for lecture, - 32 hours for structured assignments, - 32 hours for private study, - 45.33 hours for laboratory practice
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO 1. Students are able to understand Classical Mechanics (The Laws of Motion) CLO 2. Student are able to demonstrate in laboratory concept of Clasical Mechanics (The Law of Motion)
Content	1. Basics of measurement 2. Vector 3. Kinematics and dynamics of movement 4. Energy and work 5. Momentum and impuls 6. Equilibrium of rigid body and elasticity 7. Vibration and waves 8. Fluids 9. Heat and temperature
Examination forms	1. Homework 5% 2. Quiz 10% 3. Case study (group discussion) 50% 4. Mid semester exam 15% 5. Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Walker, Jearl., D. Halliday, dan R. Resnick. 2014. Fundamentals of Physics Ed-10. Wiley. USA

Module designation	KU201101 Pancasila
Semester(s) in which the module is taught	1st
Person responsible for the module	Farida Nur Hidayah, S.H., M.H.
Language	Bahasa Indonesia
Relation to curriculum	This course is a nationality compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 90.67 hours in one semester, which consist of: - 26.67 hours for lecture, - 32 hours for structured assignments, - 32 hours for private study
Credit points	2 CP (3.02 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities ILO 5. an ability to perform life-long learning and apply new knowledge as needed using appropriate learning strategies. CLO 1. Students are able to understand Pancasila as a philosophy system. CLO 2. Students are able to understand Pancasila as an ethical system way of life.
Content	1. Introduction to Pancasila Education 2. Pancasila in Indonesian history 3. Pancasila as the basis of Indonesian state 4. Pancasila as the state ideology 5. Pancasila as philosophical system 6. Pancasila as ethics system 7. Pancasila as the basis of knowledge development
Examination forms	1. Homework 5% 2. Quiz 10% 3. Case study (group discussion) 50% 4. Mid semester exam 15% 5. Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Dirjen Pembelajaran dan Kemahasiswaan, Pendidikan Pancasila untuk Perguruan Tinggi, Jakarta, Kemenristekdikti. 2016. 2. Kaderi, M. Alwi. Pendidikan Pancasila untuk Perguruan Tinggi. Banjarmasin : Antasari Press. 2015. 3. Soedarso. Filsafat Pancasila Identitas Indonesia. Surabaya : Pustaka Radja. 2014. 4. Magnis -- Suseno, Franz. Etika Politik : Prinsip - Prinsip Moral Dasar Kenegaraan Modern. Jakarta : Gramedia Pustaka Utama. 2006.

Module designation	KU201219 English
Semester(s) in which the module is taught	1st
Person responsible for the module	Alfi Suci Dirgantari, S.Pd., M.Pd.
Language	Bahasa Indonesia and English
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 90.67 hours in one semester, which consist of: - 26.67 hours for lecture, - 32 hours for structured assignments, - 32 hours for private study
Credit points	2 CP (3.02 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 5. an ability to perform life-long learning and apply new knowledge as needed using appropriate learning strategies. CLO 1. Student are able to do oral cummunication effectively using English Language CLO 2. Students are able to read and write scientific literature.
Content	1. Daily activities 2. Jobs 3. Recreational activities 4. Correspondence in formal and informal contexts 5. Academic texts; technology, environment, health, social, and economics 6. Culture
Examination forms	1. Homework 5% 2. Quiz 10% 3. Case study (group discussion) 50% 4. Mid semester exam 15% 5. Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Azar, Betty S. & Hagen, Stacy A. *Understanding and Using English Grammar, Fourth Edition.* Pearson Education White Plains, NY. 2. Richard, C, Jack. Hull, Jonathan. & Proctor Susan. Interchange, Third Edition. Cambridge University Press. 3. Deborah, Philip. Longman Complete Course for TOEFL Test. Pearson Education: New York. 4. VOA English and BBC English Application. 5. English Grammar -- Collins Cobuild, 2011. 6. Price, G. & Meier, P. 2007. *Effective Study Skills* . Essex: Pearson-Longman. 7. Brick, J. 2011. Academic Culture: A Student's Guide to Studying at University 2nd Edition. South Yarra: MacMillan. 8. Open Source Podcast and Youtube Channels.

Module designation	KU201210 Calculus II
Semester(s) in which the module is taught	2nd
Person responsible for the module	Sigit Pancahayani, S.Si., M.Si.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning),
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	Calculus I
Module objectives/intended learning outcomes	**Attitude :** ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO 1. Students are able to solve problems and solve with control over the results of mathematical calculations that require functions with many variables CLO 2. Student are able to solve problems with intergral calculation
Content	1. Transcendental function 2. Integration technique 3. Integration application 4. Indefinite form and unnatural integration 5. Sequence and series
Examination forms	1. Homework 5% 2. Quiz 10% 3. Case study (group discussion) 50% 4. Mid semester exam 15% 5. Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Varberg, D., Purcell, E., & Rigdon, S. (2007). Calculus, Ninth Edition. USA: Pearson, Prentice Hall Inc. 2. Anton, H., Bivens, I. C., & Davis, S. (2012). Calculus Early Transcendentals 10th Edition. USA: John Wiley & Sons, Inc. 3. Dosen-Dosen Jurusan Matematika ITS. (2013). Buku Ajar Kalkulus 2. Jurusan Matematika FMIPA ITS. 4. Pancahayani, S., & Dewanti, R. W. (2016). *Buku Ajar Kalkulus 2*. Program Studi Matematika ITK.

Module designation	KU201212 Physics II
Semester(s) in which the module is taught	2nd
Person responsible for the module	Menasita M, S.Si., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 26.67 hours for lecture, - 32 hours for structured assignments, - 32 hours for private study, - 45.33 hours for laboratory practice
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO 1. Students are able to understand Electrical and Magnetic Concept CLO 2. Student are able to demonstrate in laboratory Electrical and Magnetic Concept
Content	1. Electricity 2. Electrical circuits 3. Magnet 4. Light 5. Modern physics
Examination forms	1. Homework 5% 2. Quiz 10% 3. Case study (group discussion) 50% 4. Mid semester exam 15% 5. Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Walker, Jearl., D. Halliday, dan R. Resnick. 2014. Fundamentals of Physics Ed-10. Wiley. USA

Module designation	KU201217-Introduction to Statistical Methods
Semester(s) in which the module is taught	2nd
Person responsible for the module	Muhammad Azka, S.Si., M.Sc.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments - 48 hours for private study
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO 1. Students are able to know the basic concepts of statistical methods CLO 2. Students are able to manage, analyze and interpret data based on the parameters used
Content	1. Basic Concepts of Statistics 2. Descriptive Statistics 3. Basic and Conditional Opportunities 4. Random Variables and Probability Distribution 5. Parameter Estimation 6. Parameter Hypothesis Test 7. Correlation and Regression 8. One-way Analysis of Variance
Examination forms	1. Homework 5% 2. Quiz 10% 3. Case study (group discussion) 50% 4. Mid semester exam 15% 5. Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Walpole, R. E., Myers, R. H. (2002). Probability and Statistics for Scientists and Engineers. 3rd ed. New York, USA: Pearson. 2. Triola, M.F. (2010). Elementary Statistics. New York, USA: Addison-Wesley. 3. Gouri, B. C., Johnsons, R. A. (1997). Statistical Concept & Methods. New York, USA: John Wiley & Sons, Inc. 4. Spiegel, M. R., (terjemahan oleh IN Susila, Dept.Matematika ITB). 1988. Teori dan Soal-soal Statistika. Jakarta: Erlangga.

Module designation	KU201218-Algorithm and Programming
Semester(s) in which the module is taught	2nd
Person responsible for the module	Gusti Ahmad Fanshuri Alfarisy, M.Kom.
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments - 48 hours for private study
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude** ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. **Knowledge** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO 1. Students are able to formulate basic programing logic using flowchart, IPO charts and pseudo code CLO 2. Students are able to demonstrate an understanding of basic programing (Python)
Content	1. Python Programming Basics and Algorithms 2. Variables, Expressions, and Arithmetic Operations 3. Conditional Execution 4. Loop 5. List and Dictionary 6. String Manipulation 7. Procedures and Recursive Functions 8. Error Handling 9. Reading and Writing Files 10. GUI with PyQt
Examination forms	1. Homework 5% 2. Quiz 10% 3. Case study (group discussion) 50% 4. Mid semester exam 15% 5. Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1.Severance, C.R., 2016. Python for Everybody. 2.https://docs.python.org 3.https://doc.qt.io/qtforpython/tutorials/index.html 4.Cormen, T.H. (Ed.), 2009. Introduction to algorithms, 3rd ed. ed. MIT Press, Cambridge, Mass. 5.Padmanabhan, T.R., 2017. Programming with Python. Springer Berlin Heidelberg, New York, NY. 6. https://www.jetbrains.com/help/pycharm/meet-pycharm.html

Module designation	KU201103-Religion (Islam)
Semester(s) in which the module is taught	4th
Person responsible for the module	Abdul Mujib Syadzali
Language	Bahasa Indonesia
Relation to curriculum	This course is a nationality compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 90,67 hours in one semester, which consist of: - 26,67 hours for lecture, - 32 hours for structured assignments - 32 hours for private study
Credit points	2 CP (3.02 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, CLO 1. Student are able to perform good attitude (humanity, tolerance, and pluralism) based on his/her religion. CLO 2. Student are able to understand and obey the law and dicipline in multi-religious society.
Content	1. Islamic Religious Education in Public Universities 2. God, Man and Nature 3. Sources, Laws and Objectives of Islamic Shari'ah 4. Faith, Islam and Ihsan 5. Morals and Islamic Brotherhood 6. Islamic Padigma Towards a Superior Civilization Based on Science and Technology 7. Islam, Politics and the Homeland 8. Grounding Islam as Islam Rahmatan Lil'alamin 9. Mosques as Centers for Islamic Actualization
Examination forms	1. Homework 5% 2. Quiz 10% 3. Case study (group discussion) 50% 4. Mid semester exam 15% 5. Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1.Direktorat Jenderal Pembelajaran dan Kemahasiswaan. 2016. Buku Ajar Mata Kuliah Umum: Pendidikan Agama Islam. Kementerian Riset Teknologi dan Pendidikan Tinggi. Cetakan ke-1 2.Rosidin, 2019. Modul Perkuliahan Pendidikan Agama Islam. Tanggerang: TsMart 3.Syahidin dkk, Pendidikan Agama Untuk Perguruan Tinggi, Direktorat Pembelajaran dan Kemahasiswaan, Direktorat Jenderal Perguruan Tinggi, Kementerian Pendidikan Dan Kebudayaan 2014. 4.Muhibbin, Zainul dkk, Pendidikan Agama Islam: Membangun Karakter Madani, Surabaya, ITS Press, 2012 Buku 3 5.Wahyuddin dkk, Pendidikan Agama Islam untuk Perguruan Tinggi, Jakarta: Grasindo, 2009. 6.Rosidin, Pendidikan Agama Islam Untuk Perguruan Tinggi. Tanggerang, TsMart, 2017.

Module designation	KU201320-Resource Utilization
Semester(s) in which the module is taught	5th
Person responsible for the module	Firilia Filiana, S.T., M.T
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 90,67 hours in one semester, which consist of: - 26,67 hours for lecture - 32 hours for structured assignments - 32 hours for private study
Credit points	2 CP (3.02 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1.an ability to communicate effectively in oral and written manners with a range of audiences ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 5. an ability to perform life-long learning and apply new knowledge as needed using appropriate learning strategies. CLO 1. Students are able to identify, decipher and map the potential of resources in Kalimantan CLO 2. Students are able to design creativity programs for resource utilization for community economy or energy security
Content	1. Type of resource; 2. Availability and Utilization of Resources; 3. Local Economic Development (LED); 4. Review the concept of comparative & competitive advantage; 5. National Development Hierarchy; 6. Regional development in National Development; 7. Socio-Preneur.
Examination forms	1. Homework 5% 2. Quiz 10% 3. Case study (group discussion) 50% 4. Mid semester exam 15% 5. Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1.Cunningham, William P dan Cunningham, Mary Ann. 2012. Environmental Science, A Global Concern, 12th Edition. New York: McGraw-Hill Companies, Inc. 2.Adisasmita, Rahardjo. 2005. Dasar-Dasar Ekonomi Wilayah. Yogyakarta: Graha Ilmu. 3.Alkadri, et al. 2001. Manajemen Teknologi Untuk Pengembangan Wilayah. P2KTPW BPPT. Jakarta. 4.RUEN dan Permen ESDM

Module designation	KU201108-Citizenship
Semester(s) in which the module is taught	6th
Person responsible for the module	Dwiana Novianti Tufail
Language	Bahasa Indonesia
Relation to curriculum	This course is a nationality compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 90,67 hours in one semester, which consist of: - 26,67 hours for lecture - 32 hours for structured assignments - 32 hours for private study
Credit points	2 CP (3.02 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, ILO 5. an ability to perform life-long learning and apply new knowledge as needed using appropriate learning strategies. CLO 1. Students are able to identify, decipher and map the potential of resources in Kalimantan CLO 2. Students are able to design creativity programs for resource utilization for community economy or energy security
Content	1. The Concept of Citizenship Education 2. National Identity 3. National Integration 4. The Constitution in the Life of the Nation 5. Harmony of Obligations and Rights of the State and Citizens 6. Pancasila Democracy 7. Fair Law 8. Archipelago Insight 9. National Security and National Defense
Examination forms	1. Homework 5% 2. Quiz 10% 3. Case study (group discussion) 50% 4. Mid semester exam 15% 5. Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. . 2016. Pendidikan Kewarganegaraan untuk Perguruan Tinggi. Kementrian Riset, Teknologi dan Pendidikan Tinggi Republik Indonesia – Direktorat Jenderal Pembelajaran dan Kemahasiswaan

Module designation	KU201102-Indonesian
Semester(s) in which the module is taught	6th
Person responsible for the module	Rima Gusriana Harahap, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is a nationality compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 90,67 hours in one semester, which consist of: - 26,67 hours for lecture - 32 hours for structured assignments - 32 hours for private study
Credit points	2 CP (3.02 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1.an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 5. an ability to perform life-long learning and apply new knowledge as needed using appropriate learning strategies. CLO 1. Student are able to do oral cummunication effectively using Bahasa CLO 2. Students are able to write Scientific Writing by applying good and correct Indonesian language rules according to the Indonesian Spelling Guidelines (EYD)
Content	1. The position, function, and role of the Indonesian language in social life 2. The concept of text as a basic material for learning 3. Academic texts and their application in education 4. Book review text as library material 5. Research proposal text and activity proposal 6. Text of research reports and activity reports 7. Text of scientific articles
Examination forms	1. Homework 5% 2. Quiz 10% 3. Case study (group discussion) 50% 4. Mid semester exam 15% 5. Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Tim Penyusun, 2016. Bahasa Indonesia untuk Perguruan Tinggi. Buku Ajar Kemenristekdikti 2. Jurnal, artikel ilmiah, proposal penelitian dan kegiatan, tugas akhir

Module designation	KU2011321-Field Study Service
Semester(s) in which the module is taught	6th
Person responsible for the module	Firilia Filiana, S.T., M.T
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 90,67 hours in one semester, which consist of: - 26,67 hours for seminar - 18,67 hours for independent activity, - 45,33 hours for practice
Credit points	2 CP (3.02 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, ILO 5. an ability to perform life-long learning and apply new knowledge as needed using appropriate learning strategies. CLO 1. Students are able to apply and build on the results of science and technology studies to encourage sustainable community economic progress or environmentally friendly national energy security
Content	1. Type of resource; 2. Availability and Utilization of Resources; 3. Local Economic Development (LED); 4. Review the concept of comparative & competitive advantage; 5. National Development Hierarchy; 6. Regional development in National Development; 7. Socio-Preneur;
Examination forms	1. Assistance 20% 2. Presentation 15% 3. Report 15% 4. Outer 35% 5. Supervisor 15%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	-

Module designation	TM201520-Energy Audit
Semester(s) in which the module is taught	8th
Person responsible for the module	Illa Rizianiza, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1.an ability to communicate effectively in oral and written manners with a range of audiences ILO 3.an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4.an ability to apply Pancasila values, ethical and professional responsibilities, **Knowledge :** ILO 6.an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7.an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence:** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO Able to master the technical implementation and analyze building energy audits for saving opportunities energy
Content	1. Energy Auditing Basics 2. Energy Accounting and Analysis 3. Energy Economics 4. Building Envelope Audit 5. Instrumentation 6. Electrical System Audit 7. Method for Estimating Energy Saving
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Albert Thumann, William J. Younger, Terry Niehus (2010), Handbook of Energy Audits, Eighth Edition, The Fairmont Press 2. Moncef Krarti (2010), Energy Audit of Building Systems: An Engineering Approach, Second Edition, CRC Press, Taylor & Francis Group

Module designation	TM201521-Robotic Mechanism
Semester(s) in which the module is taught	8th
Person responsible for the module	Alfian Djafar, S.T., M.T
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	1. Engineering Dynamics 2. Mechatronics
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology CLO Able to analyze the movement of the robot position through kinematic and dynamic analysis of several type of robot
Content	1. Types of robots and their development 2. Kinematic analysis in the form of position and displacement (degrees of freedom of position coordinate transformation) 3. Analysis of robotic arm dynamics 4. Matrix jacobian and singularity (type of singularity in terms of matrix jacobian) 5. Robot design (screw theory, type of constraint in connection) 6. computation (computational analysis of position on displacement computationally)
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Jhon J. Craig, (1989), Introduction to Robotics, Addison-Wesley 2. Jorge Angeles (2002), Fundamentals of Robotic Mechanical Systems, Teory, Methods, and Alghorithms second Edition, Springer 3. Spong (2004), Robot Dynamics and Control Second Edition 4. Horacio Martínez-Alfaro(2011) , Advances In Mechatronics , InTech 5. Sam Cubero (2007), Industrial Robotics Theory, Modelling and Control, Pro Literatur Verla 6. Siegwart, Nourbakhsh, (2004), Introduction to Autonomus Mobile Robot, The MIT Press

Module designation	TM201522-Mechanical System for Building
Semester(s) in which the module is taught	8th
Person responsible for the module	Alfian Djafar, S.T., M.T
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology CLO. Able to design the utility system of a high-rise building
Content	1. Design of building mechanical systems 2. Heating Ventilation and Air Conditioning (HVAC) 3. Plumbing 4. Fire protection 5. Dirty water treatment 6. Transportation within the building
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Hall, Greeno (2011). Building Services Handbook Incorporating Current Building and Construction Regulations 6th Edition, Elsevier 2. Walter, dkk (2015). Mechanical and Electrical Equipment for Building 12th Edition, Willey 3. Stein, dkk. (2006). Mechanical and Electrical Equipment for Building, John Wiley and Sons 4. Departemen Pekerjaan Umum, Pedoman Tim Ahli Bangunan Gedung 5. Departemen Pekerjaan Umum, Pedoman Sertifikat Laik Fungsi Bangunan Gedung 6. Departemen Pekerjaan Umum, Pedoman Teknis Izin Mendirikan Bangunan Gedung 7. Bhatia. The MEP Desin of Building Services, CED Enginering 8. MEP Guide for Planning and Schedulling, Planninng Engineer 9. Sayogo , dkk (2014). Penjelasan PUIL (Persyaratan Umum Instalasi Listrik) 2011, HIMAPUIL

Module designation	TM201523-Computational Fluid Dynamics
Semester(s) in which the module is taught	8th
Person responsible for the module	Gad Gunawan, S.T., M.T
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	1. Fluid Mechanics I and II with a minimum value of D 2. Numerical Method with a minimum value of D
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO. Able to simulate simple flow problems with numerical simulation (C3)
Content	1. Fundamental principles of computational fluid dynamics 2. Regulatory equations in fluid dynamics 3. Numerical Simulation using Software
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Anderson, John D Jr (1995). Computational Fluid Dynamics The Basics with Applications. New York : Mc Graw Hill

Module designation	TM201524-Steam Power Plant Engineering
Semester(s) in which the module is taught	8 th
Person responsible for the module	Chaerul Qalbi AM, S.T., M.Sc.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	1. Thermodynamics I and II with a minimum value of D
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge:** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO. Able to analyze thermal equilibrium in Steam Power Plant (C4)
Content	1. Cycle and main components of PLTU 2. Heat balance in PLTU 3. Introduction of Geothermal Power Plant
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Black and Veatch (1996). Power Plant Engineering. New York : Springer

Module designation	TM201525-Heavy Equipment
Semester(s) in which the module is taught	8th
Person responsible for the module	Faisal Manta, S.T.,M.T
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO. Able to apply heavy equipment product management for each type of material in completing project
Content	1. Physical properties of the material 2. Functions and Applications of heavy equipment and attachments 3. Load and Power Analysis 4. Land Clearing Job 5. Earth Moving Job 6. Owning and operating costs
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Kadek Ade Suryawan (2019). Manajemen Alat Berat : Deeppublish 2. Rochmanhadi (1985) Perhitungan Pelaksanaan Pekerjaan dengan Menggunakan Alat-alat Berat. Jakarta: Departemen Pekerjaan Umum 3. Anonim (2012). Aplikasi dan Produksi Alat-Alat Berat: PT United Tractor Tbk

Module designation	TM201526-Corrosion
Semester(s) in which the module is taught	8
Person responsible for the module	Andi Idhil Ismail, S.T., M.Sc., Ph.D.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology CLO Able to apply the concept of corrosion control and corrosion rate analysis
Content	1. Definition, understanding 2. Understanding of terminology in the corrosion process includes understanding anode, cathode, electrolyte, conductor, redox reactions, corrosion aspects (material and environment), reaction aspects in terms of thermodynamics and electrochemistry, standard potential, polarization, passivation. Pourbaix charts.
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Fontana, Mars G./Green, Nobert D.,"Corrosion Engineering", Mac Graw Hill International Book Company 2. Jones, Denny A., "Principles and Prevention of Corrosion", Mac Millan Publishing Company, a division of MacMillan, Inc. 3. Uhlig, Herbert H., "Corrosion and Corrosion Control" an Introduction to Corrosion Science and Engineering, second edition, John Wiley & Sons, Inc.

Module designation	TM201601 Practical Work
Semester(s) in which the module is taught	7th
Person responsible for the module	Andi Idhil Ismail, S.T., M.Sc., P.hD
Language	Bahasa Indonesia
Relation to curriculum	This course is a compulsory course
Teaching methods	Tecahing methods used in this course are :Problem based learning, Project based learning, Presentation
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 90,67 hours in one semester
Credit points	2 CP (3,02 ECTS)
Required and recommended prerequisites for joining the module	Student must pass 72 CP
Module objectives/intended learning outcomes	**Attitude :** ILO 3 an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4 an ability to apply Pancasila values, ethical and professional responsibilities **Engineering Skill :** ILO 7 an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology CLO 1. Students are able to apply their critical thinking for identifying problems in the company individually or by teamwork CLO 2. Students are able to apply demonstrate their mathematical-skills and soft-skills CLO 3. Students are able to apply have good social responsibilities, professional ethic, and interpersonal skill CLO 4. Students are able to apply adapt and develop selfabilities in the professional life of the company
Content	Lecturer will choose the topics according to the chosen company. During the semester, students are doing activities appointed by company, writing a final report, and giving presentation. Pratical work can be conducted at anytime of the year
Examination forms	The weight of each assessment component is based on the assignments given by the company and the supervisor team, and activities in the company. The assessment components are report of supervisor (33%), and supervisor industrial (67%)
Study and examination requirements	Study and examination requirements: - Student must attend all activity of internship in company - Student must writing the report of internship - Student must presentate the report of internship Form of examination : Presentation Laptop/computer and company or industry
Reading list	https://me.itk.ac.id/akademik/buku_panduan_mahasiswa

<table>
<tr><td>Module designation</td><td>TM201701 Reseacrh Proposal</td></tr>
<tr><td>Semester(s) in which the module is taught</td><td>7th</td></tr>
<tr><td>Person responsible for the module</td><td>Andi Idhil Ismail, S.T., M.Sc., P.hD</td></tr>
<tr><td>Language</td><td>Bahasa Indonesia</td></tr>
<tr><td>Relation to curriculum</td><td>This course is a compulsory course</td></tr>
<tr><td>Teaching methods</td><td>Tecahing methods used in this course are :Consultation with supervisor, individual study, writing the research proposal , slide preparation, and examination</td></tr>
<tr><td>Workload (incl. contact hours, self-study hours)</td><td>For this course, students are required to meet a minimum of 90,67 hours in one semester</td></tr>
<tr><td>Credit points</td><td>2 CP (3,02 ECTS)</td></tr>
<tr><td>Required and recommended prerequisites for joining the module</td><td>1. Student should have programmed Research Proposal
2. There is a decree of the examiner team</td></tr>
<tr><td>Module objectives/intended learning outcomes</td><td>Attitude :
ILO 1 an ability to communicate effectively in oral and written manners with a range of audiences
ILO 2 an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective.
ILO 3 an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives
ILO 5 an ability to perform life-long learning and apply new knowledge as needed using appropriate learning strategies.

CLO. Student able to compile a thesis proposal report in accordance with the correct scientific writing format</td></tr>
<tr><td>Content</td><td>-</td></tr>
<tr><td>Examination forms</td><td>Assesment are carried out based on report and presentation</td></tr>
<tr><td>Study and examination requirements</td><td>Scoring the grade of Reserach Proposal is based on following asssessment component:
1. Answers of the questions addressed by the Examining Team (score 50%). t is given by Examining and Supervisor team
2. Research proposal report (score 50%). It is given by Examining and Supervisor team

Student are marked based on their score obtained and based on the following grade scale :

<table>
<tr><th colspan="5">Course Score</th><th>Letter Grade</th><th>Numerical Grade</th><th>Description</th></tr>
<tr><td>86</td><td>≤</td><td>Score</td><td>=</td><td>100</td><td>A</td><td>4.0</td><td>Very High Distinction</td></tr>
<tr><td>76</td><td>≤</td><td>Score</td><td><</td><td>86</td><td>AB</td><td>3.5</td><td>High Distinction</td></tr>
<tr><td>66</td><td>≤</td><td>Score</td><td><</td><td>76</td><td>B</td><td>3.0</td><td>Distinction</td></tr>
<tr><td>56</td><td>≤</td><td>Score</td><td><</td><td>66</td><td>BC</td><td>2.5</td><td>Credit</td></tr>
<tr><td>51</td><td>≤</td><td>Score</td><td><</td><td>56</td><td>C</td><td>2.0</td><td>Pass</td></tr>
<tr><td>41</td><td>≤</td><td>Score</td><td><</td><td>51</td><td>D</td><td>1.0</td><td>Marginal</td></tr>
<tr><td>0</td><td>=</td><td>Score</td><td><</td><td>41</td><td>E</td><td>0.0</td><td>Fail</td></tr>
</table></td></tr>
<tr><td>Reading list</td><td>https://me.itk.ac.id/akademik/buku_panduan_mahasiswa</td></tr>
</table>

<table>
<tr><td>Module designation</td><td>TM201702 Final Project</td></tr>
<tr><td>Semester(s) in which the module is taught</td><td>8th</td></tr>
<tr><td>Person responsible for the module</td><td>Andi Idhil Ismail, S.T., M.Sc., P.hD</td></tr>
<tr><td>Language</td><td>Bahasa Indonesia</td></tr>
<tr><td>Relation to curriculum</td><td>This course is a compulsory course</td></tr>
<tr><td>Teaching methods</td><td>Tecahing methods used in this course are :Consultation with supervisor, individual study, writing the research proposal , slide preparation, and examination</td></tr>
<tr><td>Workload (incl. contact hours, self-study hours)</td><td>For this course, students are required to meet a minimum of 181,33 hours in one semester</td></tr>
<tr><td>Credit points</td><td>4 CP (6,04 ECTS)</td></tr>
<tr><td>Required and recommended prerequisites for joining the module</td><td>1.Student must pass Research proposal
2. Student should have programmed Final Project
3. There is a decree of the examiner team</td></tr>
<tr><td>Module objectives/intended learning outcomes</td><td>Attitude :
ILO 1 an ability to communicate effectively in oral and written manners with a range of audiences
ILO 2 an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective.
ILO 3 an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives
ILO 4 an ability to apply Pancasila values, ethical and professional responsibilities
ILO 5 an ability to perform life-long learning and apply new knowledge as needed using appropriate learning strategies.
Knowledge :
ILO 6 an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts
Engineering Skill :
ILO 7 an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology
Competence :
ILO 8 an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions</td></tr>
<tr><td>Content</td><td>-</td></tr>
<tr><td>Examination forms</td><td>Assesment are carried out based on report and presentation</td></tr>
<tr><td>Study and examination requirements</td><td>Scoring the grade of Final Project is based on following asssessment component:
1. Answers of the questions addressed by the Examining Team (score 50%). t is given by Examining and Supervisor team
2. Research proposal report (score 50%). It is given by Examining and Supervisor team

Student are marked based on their score obtained and based on the following grade scale :
<table>
<tr><th>Course Score</th><th>Letter Grade</th><th>Numerical Grade</th><th>Description</th></tr>
<tr><td>86 ≤ Score = 100</td><td>A</td><td>4.0</td><td>Very High Distinction</td></tr>
<tr><td>76 ≤ Score < 86</td><td>AB</td><td>3.5</td><td>High Distinction</td></tr>
<tr><td>66 ≤ Score < 76</td><td>B</td><td>3.0</td><td>Distinction</td></tr>
<tr><td>56 ≤ Score < 66</td><td>BC</td><td>2.5</td><td>Credit</td></tr>
<tr><td>51 ≤ Score < 56</td><td>C</td><td>2.0</td><td>Pass</td></tr>
<tr><td>41 ≤ Score < 51</td><td>D</td><td>1.0</td><td>Marginal</td></tr>
<tr><td>0 = Score < 41</td><td>E</td><td>0.0</td><td>Fail</td></tr>
</table></td></tr>
<tr><td>Reading list</td><td>https://me.itk.ac.id/akademik/buku_panduan_mahasiswa</td></tr>
</table>

Module designation	TM201527-Renewable Energy
Semester(s) in which the module is taught	8th
Person responsible for the module	Diniar Mungil Kurniawati, S.T., M.T.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	1. Energy Conversion Machine
Module objectives/intended learning outcomes	**Attitude :** ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO. Able to analyze the potential of new renewable energy sources so as to be able to design technology new renewable energy conversion (C4).
Content	1. Introduction to New and Renewable Energy 2. NRE Conversion Technology 3. NRE Storage Technology 4. EBT Economic Studies 5. EBT Design Project
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Paul Breeze, et.al. (2009), Renewable Energy Focus HandBook, Elsevier Academic Press. 2. BPPT, (2020), Outlook Energi Indonesia 2020, PPIPE BPPT. 3. Mathew Sathyajit, (2006), Wind Energy Fundamentas, Resource Analysis and Economics, Springer.

Module designation	TM201528-Refrigeration Engineering
Semester(s) in which the module is taught	8th
Person responsible for the module	Doddy Suanggana, S.T., M.T
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	1. Energy Conversion Machine
Module objectives/intended learning outcomes	**Attitude :** ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology CLO. Able to calculate and analyze loading to determine cooling capacity and the coefficient of performance on the cooling machine
Content	1. General Concept of Refrigeration 2. Cooling Engine Components 3. The properties of air 4. Psychometric Diagrams 5. Air Conditioning System 6. Heat Load 7. Engine Cooling Cycle 8. Refrigerant 9. Standard Cycle and Effects of Operating Conditions
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Stoecker, W.F (1983), Refrigeration & Air Conditioning, USA : Mc Graw-Hill 2. Pita Edward G (2002), Air Conditioning Principles and Systems An Energy Approach, Prentice Hall 3. Grondzik Walter T (2007), Air Conditioning Systems Design Manual 2th Ed, Butterworth-Heinemann 4. Jones W.P (2001), Air Conditioning Engineering 5th Ed, Butterworth-Heinemann

Module designation	TM201529 Heat Treatment
Semester(s) in which the module is taught	8th
Person responsible for the module	Andi Idhil Ismail, S.T., M.Sc., Ph.D.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	1. Engineering Materials I and II
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO. Able to analyze material properties and apply heat treatment methods to metals
Content	1. Crystallization 2. Material Properties 3. Metal Alloy Elements 4. Heat Treatment Method 5. Heating and Cooling
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. George E.Totten,(2006), Steel Heat Treatment – Metallurgy and Technologies, CRC 2. Karl-Erik Thelning (Auth.) (1967), Steel and its Heat Treatment. Bofors Handboo, Butterworth & Co Publishers Ltd.

Module designation	TM201530 Metal Alloys
Semester(s) in which the module is taught	8th
Person responsible for the module	Andi Idhil Ismail, S.T., M.Sc., Ph.D.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	1. Engineering Materials II
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO. Able to relate from a metal alloy formation process in the form of scientific articles and solve the problem of the effect of adding an element to an alloy
Content	1. Impurities in Solid 2. Phase Diagram 3. Solubility limit 4. Phases 5. Mikrostruktur 6. Phase Equilibria 7. One-componen phase diagrams
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Avner, Sidney H (19870, Introduction to Physical Metallurgy, Second edition, Tokyo: Mc Graw Hill International Book Company 2. Astm, E. (2015) Standard practice for microetching metals and alloys. ASTM International West Conshohocken, PA. 3. Callister, William D. Jr (2007). Material Science and Engineering, John Wiley & Sins Inc., New York, 4. Ho, P. S., Wang, G., Ding, M., Zhao, J.-H. & Dai,

Module designation	TM201531 Maintenance Engineering and Management
Semester(s) in which the module is taught	8th
Person responsible for the module	Hadhimas Dwi Haryono, S.T., M.Eng.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO. Able to apply the principles of maintenance, planning and scheduling appropriately
Content	1. Preventive, Predictive, Corrective Maintenance (PM, PdM, CM) and free maintenance functions maintenance 2. Planning and scheduling 3. Measuring instruments in condition monitoring (vibration, lubricant analysis, NDT). Principle of measurement and interpretation of measurement results. 4. Principles of MTBF, reliability, availability and maintainability of RC equipment and components 5. Methods and implementation of RCM, TPM, RBI in industry. 6. Evaluation of damage to equipment and components (RCFA & FMEA) performance of maintenance functions based on KPIs and identify potential problems. Miss alignment 7. Vibration diagnosis such as unbalance, misalignment, bearing fault diagnosis, gearmess frequency, loosen component, crack shaft. 8. Alligment method, balancing method. 9. Cathodic protection for stationary equipment
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Wireman Terry (1991). Total Productive Maintenance: Industrial Press, Inc 2. Beling, Charles E (1997). Reliability and Maintainability Engineering, International Edition, McGraw-Hill. 3. Ireson, W. Grant, Coombs, Clyde F., Moss, Richard Y (1995). Hand-book Reliability Engineering and Management. Second edition: McGraw-Hill, Sydney, Tokyo, Toronto.

Module designation	TM201532 Operation Research
Semester(s) in which the module is taught	8th
Person responsible for the module	Andre Amba Matarru, S.T., M.Han.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO. Able to make decisions using scientific quantitative techniques with various research methods existing operations so that they can be applied in mechanical engineering applications such as how to find optimal value of profit, raw materials, resources, assembly line performance, production, machine performance, fuel efficiency and so on.
Content	1. Decision-making theory. 2. Linear programming, graphical solution, simplex method, sensitivity, transportation program and assignment. 3. Network model, integer programming and programming 4. Dynamic programming, queuing theory, and simulation
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Hamdy A. Taha (2017). “Operations Research: An Introduction” 10 th Edition, Pearson Education Limited. 2. Frederick S. Hillier, Gerald J. Lieberman (2015). “Introduction to Operations Research”, McGraw-Hill Education. 3. Michael W. Carter, Camille C. Price, Ghaith Rabadi (2019). “Operations Research: A Practical Approach”, Second Edition, CRC Press. 4. Ronald L. Rardin, (2015). “Optimization in Operations Research”, Second Edition, Pearson Education Limited

Module designation	TM201533 Capita Selecta
Semester(s) in which the module is taught	8th
Person responsible for the module	Andi Idhil Ismail, S.T., M.Sc., Ph.D.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusion
Content	Visiting lectures
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	Related book

Module designation	TM201501 Pumps and Compressors
Semester(s) in which the module is taught	7th
Person responsible for the module	Gad Gunawan, S.T., M.T
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 26.67 hours for lecture, - 32 hours for structured assignments, - 32 hours for private study, - 45.33 hours for laboratory practice
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	Energy Conversion Engineering with minimum value of D
Module objectives/intended learning outcomes	**Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO. Capable to choose pump/compressor according to operation condition
Content	1. The basic theory of displacement 2. Fundamental theory of pump 3. Pump construction 4. Head and NPSH Pump 5. Pump installation and maintenance 6. Classification and basic theory of compressors 7. Vapor Compression 8. Compressor construction 9. Compressor installation, operation and maintenance
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Igor, J.Karassik,Joseph P. Messina, Paul Cooper, Charles C. Heald (2001). Pump Hand Book, Third Edition. New York : Mc Graw Hill 2. Sularso dan Haruo Tahara (2000). Pompa dan Kompresor. Jakarta : Pradnya Paramita

Module designation	TM201502 Heat Exchangers
Semester(s) in which the module is taught	7th
Person responsible for the module	Doddy Suanggana, S.T., M.T
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 26.67 hours for lecture, - 32 hours for structured assignments, - 32 hours for private study, - 45.33 hours for laboratory practice
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	Thermodynamics I dan II, Heat and Mass Transfer I dan II, Energy Conversion Engineering
Module objectives/intended learning outcomes	**Attitude :** ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO. Able to apply the basics of heat exchangers and analyze the performance of heat exchangers
Content	1. Fundamental of heat transfer & fluid mechanic theory 2. Basic design of heat exchanger 3. Construction and components of heat exchangers 4. Performance of heat exchanger 5. Maintenance of heat exchanger
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Schlunder, E .U. (1983). Heat Exchanger Design Handbook, Taylor& Francis Inc 2. Kem, D. Q (1983), Process Heat Transfer, McGraw Hill 3. TEMA (1983), Standard of tubular exchanger Manufactures Association 4. Thulukkanam, Kuppan (2013). Heat Exchanger Design Handbook, 2nd Edition, CRC Press

Module designation	TM201503 Matrix Method for Structural Analysis
Semester(s) in which the module is taught	7th
Person responsible for the module	Alfian Djafar, S.T., M.T
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 26.67 hours for lecture, - 32 hours for structured assignments, - 32 hours for private study, - 45.33 hours for laboratory practice
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	Finite Element Method
Module objectives/intended learning outcomes	**Attitude :** ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO. Students are able to identify truss and beam cases and choose the right method to analyze them.
Content	1. Overview and procedures of the finite element method 2. The mathematical equations underlying the matrix method for structural analysis 3. Bar element for truss case 4. Beam element for frame case 5. Matrix code program for structural analysis using matlab 6. 2D and 3D Case Studies with software engineering
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Ghali, Neville (1978), Analisis Struktur, Erlangga 2. Amriyah Nasution(2009), Metode Matrik Kekakuan Analisis Struktur, ITB 3. Supartono, Boen (2007). Analisa Struktur dengan Metode Matrix, Universtas Indonesia Press 4. Boumard, Lavaste, Resistance Des MAteriaux, Delagrave 5. Sofia (1998). Prinsip Dasar Metode Elemen Hingga, Univrersitas Tarumanegara 6. Kosasih (2012), Teori dan Aplikasi Metode ELemen Hingga, Andi

Module designation	TM201504 Machine Tool Design
Semester(s) in which the module is taught	7th
Person responsible for the module	Hadhimas Dwi Haryono, S.T., M.Eng.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	Manufacturing Process I
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology CLO. Able to analyze concepts, equipment, structures and cutting processes on machine tools
Content	1. Conventional and unconventional machine tool structure 2. Machine tool cutting process 3. Machine tool control 4. CNC Machining
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Manfred Week (1980). Hand Book of machine Tools: 2. Koenigsberger, and J, Tlusty (1966) Machine Tools Structures : 3. N. Acmerkan D.Sc,(1969) Machine Tool design : Moscow MIR Publisher.

Module designation	TM201505 Hydraulics and Pneumatics System
Semester(s) in which the module is taught	7th
Person responsible for the module	Gad Gunawan, S.T., M.T
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology CLO. Able to apply the basic principles of hydraulics and pneumatics in their use in industry
Content	1. Hydraulic and pneumatic components 2. Hydraulic system 3. Pneumatic system
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Esposito, A., (2000). Fluid Power with Applications, New York : Prentice Hall 2. Watton, John, (1989). Fluid Power Systems, New York : Prentice Hall 3. Wolansky, William, (1990) Modern Hydraulics: New York : Maxwell

Module designation	TM201506 Combustion Engine
Semester(s) in which the module is taught	7th
Person responsible for the module	Doddy Suanggana, S.T., M.T
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	Energy Conversion Engineering
Module objectives/intended learning outcomes	**Attitude :** ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Competence :** ILO 8. an ability to develop and conduct experiment, analyze and interpret data, and use engineering judgment to draw conclusions CLO. Able to calculate and analyze the Otto and diesel cycles as well as the components of the motor so that it can modify the combustion system that occurs in the motor.
Content	1. Gasoline and diesel engine 2. Otto Siklus Cycle 3. Diesel Cycle 4. The ideal cycle of the combustion engine 5. Heat balance 6. The process of burning gasoline and diesel motors 7. Turbochargers and superchargers 8. Diesel motor simple design
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Domkundwar, V.M (2001), Course of Internal Combustion Engine, New Delhi : Dhanpat raid & Company Pustaka Pendukung 2. Arismunandar, W (1988), Penggerak Mula Motor Bakar Torak , Bandung : ITB 3. Heywood, Jhon B (1988), Internal Combustion Engine Fundamental, Singapore : Mc Graw-Hill 4. Pulkrabek Willard W (1997), Engineering Fundamentals of the Internal Combustion Engine, Prentice Hall Inc

Module designation	TM201507 Vehicle Engineering
Semester(s) in which the module is taught	7th
Person responsible for the module	Alfian Djafar, S.T., M.T
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology CLO1. Students are able to design and analyze analytically and conduct studies on Vehicle engineering, CLO1. Applying basic construction courses in the automotive field CLO3. Technical analysis on the dynamics of the vehicle and its propulsion which can then be designed.
Content	1. The main components and materials of the vehicle 2. Vehicle body structure design concept 3. Fundamentals of vehicle dynamics 4. Vehicle tire characteristics 5. Chassis 6. Vehicle wind loads 7. Vehicle traction performance 8. Vehicle braking system 9. Vehicle direction behavior
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. GILLESPIE (2001), Fundamentals of Vehicle Dynamics, Society of Automotive Engineers Inc, Butterwort Heinemann 2. I Nyoman Sutantra (2010), Teknologi Otomotif Edisi Kedua PustakaPendukung 3. Reimpel, dkk. The Automotive Chassis: Engineering Principles

Module designation	TM201508 Casting Technology
Semester(s) in which the module is taught	7th
Person responsible for the module	Hadhimas Dwi Haryono, S.T., M.Eng.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology CLO. Able to plan, produce small-scale castings
Content	1. The concept of mold making process, metal melting process, casting, casting freezing 2. Mold materials, design patterns, design molds, choose casting processes, choose materials, choose furnace and test the characteristics of molded materials and molten metal 3. Casting concept
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Surdia, Tata. (1980). Teknik Pengecoran Logam, Jakarta : PT Pradiniya Paramita Pustaka Pendukung 2. J.S Campbell, (1995), Priciple Of manufacturing Materials And Process, Tata McGraw Hill, 3. P C Pandey and C K Singh, (2003), Production Engineering Sciences, Standard Publisher Ltd., 4. S Kalpakjian and S R Schmid, (2019), manufacturing Process for Engineering Materials, Pearson education.

Module designation	TM201509 Welding Technology
Semester(s) in which the module is taught	7th
Person responsible for the module	Andi Idhil Ismail, S.T., M.Sc., Ph.D.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	1. Engineering Materials 2 2. Manufacturing Process 2
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO. Know and understand the principles and factors that are important in welding CLO. Have the physical and cognitive ability to take welding certification
Content	1. Definition, scope of welding, history and classification of welding processes. 2. Arc welding basics 3. Welding physics, arc welding characteristics, heat flow in welding 4. Power sources for welding / welding machines 5. Welded joint design principles and welding symbols 6. Welding metallurgy 7. Residual stress, welding defects, 8. Welding quality assessment 9. Modern welding techniques
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Cary, H.B. (2011). Modern welding technology. Englewood Cliffs, N.J.: Prentice-Hall. 2. Goldak, J.A. and Mehdi Akhlaghi (2005). Computational welding mechanics. New York: Springer. 3. K Weman (2012). Welding processes handbook. Cambridge Woodhead. 4. Messler, R.W. (2005). Joining of materials and structures : from pragmatic process to enabling technology. New Delhi: Elsevier. 5. Sindo Kou (2020). Welding Metallurgy. S.L.: John Wiley.

Module designation	TM201510 Fracture Mechanic and Failure Analysis
Semester(s) in which the module is taught	7th
Person responsible for the module	Andi Idhil Ismail, S.T., M.Sc., Ph.D.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	Metallurgy 2
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO. Able to identify and explain fatigue and material failure mechanisms and apply them to failure analysis, as well as calculate the service life of components in mechanical systems.
Content	1. Classification of fractures and failures (Mechanical stress fractures, fatigue fractures, fractures and cracks due to corrosion, metal brittleness, welding cracks, work hardening cracks, thermal shock) 2. Fractures and material failure of fracture characteristics, cohesive forces and Griffith theory 3. Fracture and failure of the material from the metallographic aspect and the notch effect 4. Rate of release of strain energy 5. Plane strain toughness, Dugdale model, area of plasticity at the crack tip 6. Creep failure 7. Failure to melt (fatique) 8. Damage analysis, microstructural inspection, fractography, fracture surface protection
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Anderson, T.L. (2017). Fracture mechanics : fundamentals and applications. Boca Raton: Crc Press/Taylor & Francis. 2. Bannantine, J.A., Comer, J.J. and Handrock, J.L. (1990). Fundamentals of metal fatigue analysis. Englewood Cliffs, N.J.: Prentice Hall. 3. Shackelford, J.F. (2016). Introduction to materials science for engineers. Boston U.A.: Pearson. 4. Smith, W.F. and Hashemi, J. (2019). Foundations of materials science and engineering. New York Ny: Mcgraw-Hill Education.

Module designation	TM201511 Occupational Health and Safety
Semester(s) in which the module is taught	7th
Person responsible for the module	Faisal Manta, S.T., M.T
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology CLO. Able to apply regulations, K3 management to minimize sources/potential accidents in the work area and environment
Content	1. OHS regulations 2. OHS Management 3. Personal Protective Equipment (PPE) 4. RK 3K construction 5. Environmental Management System 6. OHS Mechanical and electrical work 7. OHS Construction work 8. OHS Fire Extinguishing System 9. Work Accident Analysis
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Kamala & rao (2007). Enviromental Engineering. New Delhi : McGraw Hill 2. Gunawan (2009). Analisa Mengenal Dampak Lingkungan. Yogyakarta : Gajah Mada University Press, 3. Anonymous (2008). Pedoman K3: Departemen Tenaga Kerja

Module designation	TM201512 Engineering Economics
Semester(s) in which the module is taught	7th
Person responsible for the module	Hadhimas Dwi Haryono, S.T., M.Eng.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 2. an ability to solve complex problems, and make informed judgments, which must consider the sustainability aspect as well as to utilize information technology and the potential of national resources with a global perspective. ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts CLO. Able to apply the basic concepts of Engineering Economics as part of the decision-making process in analyzing equipment replacement or product development by considering the economic impact of an engineering application problem in an industry.
Content	1. Role of engineering economy in the decision making process 2. Derivation of engineering economy factors and their use 3. Nominal and effective interest rates and continuous compounding 4. Use of multiple factors 5. Present worth and capitalized cost evaluation 6. Equivalent uniform annual worth evaluation 7. Rate of return computation 8. Benefit/Cost ratio evaluation 9. Replacement analysis 10. Inflation, cost estimation and indirect cost allocation 11. Depreciation and depletion models 12. Break-even analysis and payback period 13. Minimum attractive rate of return 14. Sensitivity analysis and expected value decisions
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Sharma, Kal Renganathan, (2015). “An introduction to engineering economics”, Momentum Press, 2. David L. Whitman, Ronald E. Terry, (2012). “Fundamentals of Engineering Economics and Decision”, Morgan & Claypool Publishers. 3. Chan S. Park, (2012). “Fundamentals of Engineering Economics”, Third Edition, Pearson Education, 4. Chan S. Park, (2006). “Contemporary Engineering Economics”, Prentice Hall. 5. Yates, J. K, (2017). “Engineering Economics”, CRC Press. 6. Sharma, Kal Renganathan, (2015). “Practical applications of engineering economics”, Momentum Press.

Module designation	TM201513 Materials Selection and Processes
Semester(s) in which the module is taught	7th
Person responsible for the module	Hadhimas Dwi Haryono, S.T., M.Eng.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry)
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 136 hours in one semester, which consist of: - 40 hours for lecture, - 48 hours for structured assignments, - 48 hours for private study,
Credit points	3 CP (4.53 ECTS)
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Attitude :** ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 4. an ability to apply Pancasila values, ethical and professional responsibilities, **Knowledge :** ILO 6. an ability to identify, formulate, and solve mechanical engineering problems by applying principles of engineering, science, and mathematics in mechanical systems in global, economic, environmental, and societal contexts **Engineering Skill :** ILO 7. an ability to model, analyse, design, and realize physical systems, components or processes using appropriate materials by utilizing information technology CLO. Able to analyze and complete the need for a material against the needs of the system/tools required according to applicable standards.
Content	1. Process and design criteria 2. Design Type 3. Material selection principle, material index 4. Material diagram 5. Classification and process flow chart 6. Application of materials (static structure, fatigue resistance, corrosion resistance, high temperature resistance worn out) 7. Brittle material 8. Biomaterials
Examination forms	1.Homework 5% 2.Quiz 10% 3.Case study (group discussion) 50% 4.Mid semester exam 15% 5.Final Exam 20%
Study and examination requirements	Study and examination requirements: - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Student must pass the laboratory practice to get final grade. - Students must attend the exam to get final grade. Form of examination: Written exam, Presentation in class, Individual or Group assignments
Reading list	1. Surdia, Tata (1980) Teknik Pengecoran Logam, Jakarta : PT Pradiniya Paramita. 2. William D. Callister, J. (2006). Materials Science andEnginering: An Introduction. Asia: John Wiley & Sons, Inc. 3. J.S Campbell (1995.) Priciple Of manufacturing Materials And Process, Tata McGraw Hill, 4. P C Pandey and C K Singh (2003). Production Engineering Sciences, Standard Publisher Ltd., 5. S Kalpakjian and S R Schmid (2019). manufacturing Process for Engineering Materials, Pearson education.

Module designation	TM201514 Internship A
Semester(s) in which the module is taught	6th
Person responsible for the module	Andi Idhil Ismail, S.T., M.Sc., Ph.D.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry), Project Based Learning
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 181,33 hours in one semester
Credit points	4 CP (6.04 ECTS)
Required and recommended prerequisites for joining the module	1.Minimum pass semester 5 with the number of credits that have passed at least 100 credits. 2.Internship implementation is recognized in semester credit units (credits). 3.The number of Internship credits can be equaled to the credits of Compulsory Courses, Practical Work, Final Project and/or elective courses. 4.The implementation of the Internship will technically be regulated in the Internship Agreement between ITK represented by the Internship And Internship Partner study program.
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 5. an ability to perform life-long learning and apply new knowledge as needed using appropriate learning strategies.
Content	1.Internship is the implementation of science and skills that have been obtained from lecture activities to contribute to problem solving (problem solving) in the Internship Partner with the field of work in accordance with the scientific group of the study program. 2.The scope of internship work not only includes studies, but must provide a result of real work such as analysis and results or recommendations for solving a problem, information systems, policies, planning and others.
Examination forms	1. Field Supervisor (44%) 2. Supervisor (34%) 3. Examiner Lecturer (22%)
Study and examination requirements	1. The internship application procedure follows the PMMB program held by BUMN periodically. 2. Students participated in the selection of Internship candidates conducted by the Forum Human Capital Indonesia (FHCI) facilitated by the Field of Career Guidance and the Student and Alumni Center Job Exchange. 3. Students who participate in the selection must bring: CV (Curriculum Vitae), Photocopy of value transkip, Integrity Pact signed by the Study Program Coordinator. 4. Students are willing to follow all the rules determined by the industry. 5. Students who are interns must bring a Letter of Assignment signed by the Head of the Department
Reading list	https://me.itk.ac.id/akademik/buku_panduan_mahasiswa

Module designation	TM201515 Internship B
Semester(s) in which the module is taught	6th
Person responsible for the module	Andi Idhil Ismail, S.T., M.Sc., Ph.D.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry), Project Based Learning
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 362,67 hours in one semester
Credit points	8 CP (12,09 ECTS)
Required and recommended prerequisites for joining the module	1.Minimum pass semester 5 with the number of credits that have passed at least 100 credits. 2.Internship implementation is recognized in semester credit units (credits). 3.The number of Internship credits can be equaled to the credits of Compulsory Courses, Practical Work, Final Project and/or elective courses. 4.The implementation of the Internship will technically be regulated in the Internship Agreement between ITK represented by the Internship And Internship Partner study program.
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 5. an ability to perform life-long learning and apply new knowledge as needed using appropriate learning strategies.
Content	1.Internship is the implementation of science and skills that have been obtained from lecture activities to contribute to problem solving (problem solving) in the Internship Partner with the field of work in accordance with the scientific group of the study program. 2.The scope of internship work not only includes studies, but must provide a result of real work such as analysis and results or recommendations for solving a problem, information systems, policies, planning and others.
Examination forms	1. Field Supervisor (44%) 2. Supervisor (34%) 3. Examiner Lecturer (22%)
Study and examination requirements	1. The internship application procedure follows the PMMB program held by BUMN periodically. 2. Students participated in the selection of Internship candidates conducted by the Forum Human Capital Indonesia (FHCI) facilitated by the Field of Career Guidance and the Student and Alumni Center Job Exchange. 3. Students who participate in the selection must bring: CV (Curriculum Vitae), Photocopy of value transkip, Integrity Pact signed by the Study Program Coordinator. 4. Students are willing to follow all the rules determined by the industry. 5. Students who are interns must bring a Letter of Assignment signed by the Head of the Department
Reading list	https://me.itk.ac.id/akademik/buku_panduan_mahasiswa

Module designation	TM201516 Internship C
Semester(s) in which the module is taught	6th
Person responsible for the module	Andi Idhil Ismail, S.T., M.Sc., Ph.D.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry), Project Based Learning
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 544 hours in one semester
Credit points	12 CP (18,13 ECTS)
Required and recommended prerequisites for joining the module	1.Minimum pass semester 5 with the number of credits that have passed at least 100 credits. 2.Internship implementation is recognized in semester credit units (credits). 3.The number of Internship credits can be equaled to the credits of Compulsory Courses, Practical Work, Final Project and/or elective courses. 4.The implementation of the Internship will technically be regulated in the Internship Agreement between ITK represented by the Internship And Internship Partner study program.
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 5. an ability to perform life-long learning and apply new knowledge as needed using appropriate learning strategies.
Content	1.Internship is the implementation of science and skills that have been obtained from lecture activities to contribute to problem solving (problem solving) in the Internship Partner with the field of work in accordance with the scientific group of the study program. 2.The scope of internship work not only includes studies, but must provide a result of real work such as analysis and results or recommendations for solving a problem, information systems, policies, planning and others.
Examination forms	1. Field Supervisor (44%) 2. Supervisor (34%) 3. Examiner Lecturer (22%)
Study and examination requirements	1. The internship application procedure follows the PMMB program held by BUMN periodically. 2. Students participated in the selection of Internship candidates conducted by the Forum Human Capital Indonesia (FHCI) facilitated by the Field of Career Guidance and the Student and Alumni Center Job Exchange. 3. Students who participate in the selection must bring: CV (Curriculum Vitae), Photocopy of value transkip, Integrity Pact signed by the Study Program Coordinator. 4. Students are willing to follow all the rules determined by the industry. 5. Students who are interns must bring a Letter of Assignment signed by the Head of the Department
Reading list	https://me.itk.ac.id/akademik/buku_panduan_mahasiswa

Module designation	TM201517-Internship D
Semester(s) in which the module is taught	6th
Person responsible for the module	Andi Idhil Ismail, S.T., M.Sc., Ph.D.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry), Project Based Learning
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 725,33 hours in one semester
Credit points	16 CP (24,18 ECTS)
Required and recommended prerequisites for joining the module	1.Minimum pass semester 5 with the number of credits that have passed at least 100 credits. 2.Internship implementation is recognized in semester credit units (credits). 3.The number of Internship credits can be equaled to the credits of Compulsory Courses, Practical Work, Final Project and/or elective courses. 4.The implementation of the Internship will technically be regulated in the Internship Agreement between ITK represented by the Internship And Internship Partner study program.
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 5. an ability to perform life-long learning and apply new knowledge as needed using appropriate learning strategies.
Content	1.Internship is the implementation of science and skills that have been obtained from lecture activities to contribute to problem solving (problem solving) in the Internship Partner with the field of work in accordance with the scientific group of the study program. 2.The scope of internship work not only includes studies, but must provide a result of real work such as analysis and results or recommendations for solving a problem, information systems, policies, planning and others.
Examination forms	1. Field Supervisor (44%) 2. Supervisor (34%) 3. Examiner Lecturer (22%)
Study and examination requirements	1. The internship application procedure follows the PMMB program held by BUMN periodically. 2. Students participated in the selection of Internship candidates conducted by the Forum Human Capital Indonesia (FHCI) facilitated by the Field of Career Guidance and the Student and Alumni Center Job Exchange. 3. Students who participate in the selection must bring: CV (Curriculum Vitae), Photocopy of value transkip, Integrity Pact signed by the Study Program Coordinator. 4. Students are willing to follow all the rules determined by the industry. 5. Students who are interns must bring a Letter of Assignment signed by the Head of the Department
Reading list	https://me.itk.ac.id/akademik/buku_panduan_mahasiswa

Module designation	TM201518-Internship E
Semester(s) in which the module is taught	6th
Person responsible for the module	Andi Idhil Ismail, S.T., M.Sc., Ph.D.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry), Project Based Learning
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 906,67 hours in one semester
Credit points	20 CP (30,22 ECTS)
Required and recommended prerequisites for joining the module	1.Minimum pass semester 5 with the number of credits that have passed at least 100 credits. 2.Internship implementation is recognized in semester credit units (credits). 3.The number of Internship credits can be equaled to the credits of Compulsory Courses, Practical Work, Final Project and/or elective courses. 4.The implementation of the Internship will technically be regulated in the Internship Agreement between ITK represented by the Internship And Internship Partner study program.
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 5. an ability to perform life-long learning and apply new knowledge as needed using appropriate learning strategies.
Content	1.Internship is the implementation of science and skills that have been obtained from lecture activities to contribute to problem solving (problem solving) in the Internship Partner with the field of work in accordance with the scientific group of the study program. 2.The scope of internship work not only includes studies, but must provide a result of real work such as analysis and results or recommendations for solving a problem, information systems, policies, planning and others.
Examination forms	1. Field Supervisor (44%) 2. Supervisor (34%) 3. Examiner Lecturer (22%)
Study and examination requirements	1. The internship application procedure follows the PMMB program held by BUMN periodically. 2. Students participated in the selection of Internship candidates conducted by the Forum Human Capital Indonesia (FHCI) facilitated by the Field of Career Guidance and the Student and Alumni Center Job Exchange. 3. Students who participate in the selection must bring: CV (Curriculum Vitae), Photocopy of value transkip, Integrity Pact signed by the Study Program Coordinator. 4. Students are willing to follow all the rules determined by the industry. 5. Students who are interns must bring a Letter of Assignment signed by the Head of the Department
Reading list	https://me.itk.ac.id/akademik/buku_panduan_mahasiswa

Module designation	TM201519-Internship F
Semester(s) in which the module is taught	6th
Person responsible for the module	Andi Idhil Ismail, S.T., M.Sc., Ph.D.
Language	Bahasa Indonesia
Relation to curriculum	This course is an elective course
Teaching methods	Teaching methods used in this course are : Interactive Lecture (i.e., group investigation, small group discussion, case study, and video based learning), Case study (i.e., case study in industry), Project Based Learning
Workload (incl. contact hours, self-study hours)	For this course, students are required to meet a minimum of 1088 hours in one semester
Credit points	24 CP (136,27 ECTS)
Required and recommended prerequisites for joining the module	1.Minimum pass semester 5 with the number of credits that have passed at least 100 credits. 2.Internship implementation is recognized in semester credit units (credits). 3.The number of Internship credits can be equaled to the credits of Compulsory Courses, Practical Work, Final Project and/or elective courses. 4.The implementation of the Internship will technically be regulated in the Internship Agreement between ITK represented by the Internship And Internship Partner study program.
Module objectives/intended learning outcomes	**Attitude :** ILO 1. an ability to communicate effectively in oral and written manners with a range of audiences ILO 3. an ability to collaborate effectively in multidisciplinary and multicultural team whose members together provide leadership to achieve the objectives ILO 5. an ability to perform life-long learning and apply new knowledge as needed using appropriate learning strategies.
Content	1.Internship is the implementation of science and skills that have been obtained from lecture activities to contribute to problem solving (problem solving) in the Internship Partner with the field of work in accordance with the scientific group of the study program. 2.The scope of internship work not only includes studies, but must provide a result of real work such as analysis and results or recommendations for solving a problem, information systems, policies, planning and others.
Examination forms	1. Field Supervisor (44%) 2. Supervisor (34%) 3. Examiner Lecturer (22%)
Study and examination requirements	1. The internship application procedure follows the PMMB program held by BUMN periodically. 2. Students participated in the selection of Internship candidates conducted by the Forum Human Capital Indonesia (FHCI) facilitated by the Field of Career Guidance and the Student and Alumni Center Job Exchange. 3. Students who participate in the selection must bring: CV (Curriculum Vitae), Photocopy of value transkip, Integrity Pact signed by the Study Program Coordinator. 4. Students are willing to follow all the rules determined by the industry. 5. Students who are interns must bring a Letter of Assignment signed by the Head of the Department
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