# MODULE Handbook

## 2018



Bachelor of Education in Electrical Engineering Faculty of Engineering Universitas Negeri Yogyakarta **Leading in Character Education** 

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#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Islamic Studies
Module level,if applicable:	Undergraduate
Code:	MKU6301
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	1 <sup>st</sup>
Module coordinator:	Syukri Fathudin Achmad W. S.Ag., M.Pd
Lecturer(s):	Dr. Amir Syamsudin, S.Ag., M.Ag.
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	150 minutes lectures and 180 minutes structured activities per week.
Teaching and Learning Method	Discussion, Lecturing
Workload:	Total workload is 136 hours per semester which consists of 150 minutes lectures, 180 minutes structured activities, and 180 minutes self-study per week for 16 weeks.

Credit points:	3						
Prerequisites course(s):	-						
	After taking this course the students have ability to: ELO1 Demonstrate piousness to God, high loyalty to						
Expected learning Outcomes:		ademic values, norms, and ethics					
		ELO2 Demonstrate nationalism, responsibility, and tolerance to both society and environmet.					
	CO1	Be faithful to God Almighty and be able to show a religious attitude.					
	CO2	Uphold the value of humanity in carrying out duties based on religion, morals, and ethics.					
	CO2.1	Describe human concepts.					
	CO2.2	Describe the concept of religion.					
	CO2.3	Describe the relationship between humans and religion					
	CO2.4	Describe the understanding of Islam.					
	CO2.5 Explain the characteristics of the Islamic religion						
	CO2.6	Explain the position of Islam among the religions in the world.					
	CO2.7	Describe the basic framework of Islamic teachings.					
	CO2.8	Describe the aqidah of Islam.					
Course Oucomes:	CO2.9	CO2.9 Describe Islamic Syariah.					
	CO2.10	Describe the character of Islam.					
	CO3	Uphold the value of humanity in carrying out duties based on religion, morals, and ethics.					
	CO3.1	Analyzing the sources of Islamic teachings.					
	CO3.2	Analyzing Al-Qur'an as a source of Islamic teachings.					
	CO3.3	Analyzing as-Sunnah as a source of Islamic teachings.					
	CO3.4	Analyzing Ijtihad as a Source of Islamic teachings.					
	CO4	Respect the diversity of cultures, views, religions, and beliefs, as well as other people's original opinions or findings.					
	CO4.1	Implement Islamic politics in the life of Indonesian society.					

	CO4	.2 Ap	plying the	value of Isla	am in realiz	zing civil	society.
	CO4	-					
	CO4	.5 Ap					
	CO4	.6 Un	Understanding gender values in Islam.				
	CO4	.7 An	alyzing fu	Indamentalis	sm in Islam	٦.	
	CO4	.8 An	alyzing m	arriage in Is	lam.		
				ELO1	E	LO2	
				ELUI	E	LUZ	_
		(	01	✓			
ELO and CO mapping		(	02			✓	
		(	03			✓	
		(	04			✓	
Courses Description:	rationa attenti beings	al and o ion to th	dynamic e deman	oble charad attitude, an ds to establ religion	d have a sh harmor	broad w ny amor	view, pay ng human
Assessments	ac (C 2. Fi as Fi	chievem CO1) and nal sco ssessme ssignme nal Exar	ents, nan d (CO2). res inclu ents obtain nts, prese minations	s carried o nely attainm de the resu ned from ind entations, q with the foll veight as fol	ent learnin ults of ge dividual as uizzes, In owing guid	ng achie neral k signmer sert Exa	evements nowledge nts, group
	No	CO		ssment bject	Assess Techni		Weight
	1	CO1- CO2	Attitude (presen activity, honesty	ce, discipline,	Observat	ion	10%

			Individual Assessment	article	15%
			Group Assessment	Presentation and Aricle	15%
			Midterm	Written test	20%
			Final Exam	Written test	40%
				Total	100%
Forms of media:	Board	d, LCD P	rojector, Laptop/Con	nputer	
Literature:	<ol> <li>Board, LCD Projector, Laptop/Computer</li> <li>Marzuki. 2012. Pembinaan Karakter Mahasiswa melalui Pendidikan Agama Islam di Perguruan Tinggi Umum. Yogyakarta: Penerbit Ombak.</li> <li>Marzuki. 2009. Prinsip dasar Akhlak mulia: Pengantar studi kondep-konsep dasaretika dalam Islam. Yogyakarta: Debut Wahana Press-FISE UNY.</li> <li>Sudrajat, Ajat et all. 2008. Din Al-Islam: Pendidikan Agama Islam di Perguruan Tinggi Umum. Yogyakarta: UNY Press.</li> <li>Ali, Mohammad Daud. 2000. Pendidikan Agama Islam. Jakarta: Rajawali Press.</li> <li>Azra, Azyumardi. 1999. Pendidikan Islam: Tradisi dan Modernisasi Menuju Milenium Baru. Jakarta: Logos.</li> <li>Al-Qur'an Al-Karim</li> <li>Al-Abrasyi, M. Athiyah. 1987. Dasar-dasar Pokok Pendidikan Islam. Terj. H. Bustami A. Gani dan Djohar Bahry L.I.S. Jakarta: Bulan Bintang. Cet. V</li> <li>Rahman, Fazlur. 1984. Islam. Bandung: Pustaka.</li> <li>Nasution, Harun. 1979. Islam Ditinjau dari Berbagai Aspeknya. Jilid I &amp; II. Jakarta: UI Press.</li> <li>Musa, Muhammad Yusuf. 1988. Islam Suatu Kajian Komprehensif. Terj. A. Malik Madany dan Hamim Ilyas.</li> </ol>				gi Umum. antar studi ogyakarta: an Agama INY Press. ma Islam. radisi dan gos. ar Pokok an Djohar a. Berbagai atu Kajian
Date of revision	10 Au	ugust 20	18		



#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Science of Education
Module level,if applicable:	Undergraduate
Code:	MDK6201
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	1 <sup>st</sup>
Module coordinator:	Arif Rohman, M.Si
Lecturer(s):	Estu miyarso, M.Pd
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Lecture, Discussion, Practicum, Question and Answer
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks

Credit points:	2						
Prerequisites course(s):	-						
Expected learning Outcomes:	After taking this course the students have ability to: ELO1 Demonstrate piousness to God, high log academic values, norms, and ethics						
	to	ELO2 Demonstrate nationalism, responsibility, and tolerance to both society and environmet					
		apable to perform professional works in his/her field of pertise both individual and team works					
Course Oucomes:	CO1 CO1.1	Embodying academic values, norms, and ethics. Understand the meaning and nature of education.					
	CO1.2	Understand the relationship between education and the development of human civilization.					
	CO1.3	Understanding when the education process can occur.					
	CO1.4	Understanding why educational practice needs to be based on educational theory.					
	CO1.5	Understand the foundations and essence of the historical red thread of education in Indonesia and education streams					
	CO1.6	Understand the nature of education.					
	CO1.7	Understand the science of education and its role in the theory and practice of education.					
	CO2	Respecting the diverse cultures, views, religions and beliefs, as well as opinions or original invention of others.					
	CO2.1	Understanding the understanding of the education system.					
	CO2.2	Understand the meaning and importance of interaction and interdependence between components of the education system.					
	CO2.3	Understand the importance of the formation of a whole person.					
	CO2.4	Understand the central role of educators in the education process.					
	CO2.5	Understand the essence of lifelong education.					
	CO2.6	Know the forms and ways of lifelong education.					
	CO2.7	Identify the nature of the problem of education.					

	CO2.8		erstanding the lems.	categorization	of educational
	CO3 Apply logical, critical, systematic, and inno thinking in the context of knowledge technology development or implementation on the respective field.		wledge and/or		
	CO3.1		erstand the impewal / innovation	ortance of educ	ational
ELO and CO mapping				-	
			ELO1	ELO2	ELO3
	CO1	1	✓		
	CO2	2		~	
	COS	3			<b>~</b>
Assessments	<ul> <li>This course discusses the basic principles of education basic concepts of education and its application in edu praxis which includes: the phenomenon of educat historical point of view of education, the nature of educat education, education as a system, and issues (is education in contexts) educational renewal (innovation</li> <li>1. Attitude assessment is carried out at each meetir observation techniques and / or self-assessment u assumption that basically every student has attitude. The student is given a value of a ve attitude or not good if it shows significantly better good attitude compared to the attitude of stud general. The results of the attitude assessment a component of the student's final grade, but rather of the graduation requirements. Students will g from this course if at least have a good attitude. assessment also considers the activeness of stollowing lectures.</li> <li>2. The final score includes the results of the assignments, group assignments, presentations Tests, and Final Exams with the following guidelin</li> </ul>		education, the of education and sues (issues of novation). In meeting using sment using the nt has a good of a very good ly better or less of students in sment are not a ut rather as one attitude. Attitude ess of students of the attitude ons, individual entations, Insert		

	No	со	Assessment Object	Assessment Technique	Weight
	1	CO1- CO3	Assignment	Completion of Tasks and Papers	20%
			Practicum report	Small Discussion / Seminar	20%
			Final Project Performance	Mid Semester Exam	20%
			Final Project Report	Final exams	25%
			Attendance	Documentation	15%
				Total	100%
Forms of media:	Board, LCD Projector, Laptop/Computer				
Literature:	1. Arif Rohman. 2009. Memahami Pendidikan dan Ilmu Pendidikan. Yogyakarta: Laksbang Mediatama.				
	2. Depdikbud . 1985. Pendidikan di Indonesia dari Jaman ke Jaman. Jakarta : Balai Pustaka				
		Dwi Sisv JNY Pre	voyo dkk. 2007. Iln ss.	nu Pendidikan. Y	'ogyakarta:
	F		disusanto, Suryati Sid ar Ilmu Pendidikar (ARTA.		•
			່a . 1980. Driyaı rta : Penerbit Kanisiu		Pendidikan.
			Goodlad,. Education Bass Publishers	al Renewal. San	francisco :
	<ol> <li>John Dewey. 1950. Democracy and Education. New York</li> <li>The Macmillan Company.</li> </ol>			. New York	
	8. Imam Barnadib & Sutari Imam Barnadib. 1996. Beberapa Aspek Substansial Ilmu Pendidikan. Yogyakarta : Penerbit Andi.				
			2002. Filsafat Adicita Karya Nusa	Pendidikan. Yo	gyakarta :

	10. Noeng Muhadjir. 2000. Ilmu Pendidikan dan Perubahan Sosial. Yogyakarta : Rake Sarasin.
	11. Sumitro, dkk. 2006. Pengantar Ilmu Pendidikan. Yogyakarta : UNY Press.
	12. Tilaar, H.A.R. 2002. Pendidikan dan Perubahan Sosial : Pengantar Pedagogik Transformatif untuk Indonesia . Jakarta : Penerbit Grasindo
	13 2005. Manifesto Pendidikan Nasional. Jakarta : Penerbit Buku Kompas.
	14. Umar Tirtahardja & La Sulo. 1997. Pengantar Pendidikan. Jakarta : Ditjen Dikti, Depdikbud.
	15. UU No. 20 Tahun 2003. Tentang Sistem Pendidikan Nasional.
	16. Wardiman Djojonegoro .1996. Lima Puluh Tahun Perkembangan Pendidikan Indonesia. Jakarta : Depdikbud.
Date of revision	30 August 2018



#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Mathematics
Module level, if applicable:	Undergraduate
Code:	KTF6205
Sub-heading, if applicable:	-
Classes, if applicable:	-
Semester:	1 <sup>st</sup>
Module coordinator:	Drs. Nur Kholis, M.Pd.
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Lecturing
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.

Credit points:	2
Prerequisites course(s):	-
Expected learning outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics.</li> <li>ELO3 Can carry out work in accordance with the professional field of expertise both individually and in teams</li> <li>ELO4 Master in basic sciences and principles of electric</li> <li>ELO7 Analyze and solve technical problems related to electrical engineering by applying the principles of Mathematics.</li> </ul>
Course Outcomes	<ul> <li>CO1 Devotion to God Almighty and able to show religious attitude.</li> <li>CO2 Demonstrates a responsible and independent attitude towards the assigned work.</li> <li>CO3 Knowledge of the principles of Mathematics and Physics related to the principles of electricity.</li> <li>CO3.1 Understanding notations or symbols in mathematics, numbers, basic algebraic rules, logarithms, trigonometry, number systems.</li> <li>CO3.2 Understand the concept of complex numbers &amp; numbers systems.</li> <li>CO3.3 Understand the concepts of matrices &amp; systems of linear equations.</li> <li>CO3.4 Understand the differential concept for functions with 1 independent variable</li> <li>CO3.5 Understand integral concepts for functions with 1 independent variable.</li> <li>CO4 Analyze and solve technical problems related to electrical engineering by applying the principles of Mathematics.</li> <li>CO4.1 Apply notations or symbols in mathematics, number systems in understanding the next concept.</li> <li>CO4.2 Solve problems that require complex numbers &amp; numbers systems.</li> <li>CO4.3 Solve problems that require a differential for functions with 1 independent variable.</li> <li>CO4.4 Solve problems that require a differential for functions with 1 independent variable.</li> </ul>

			ELO1	ELO3	ELO4	ELO7		
ELO and CO mapping		CO1	✓					
		CO2		<b>~</b>				
		CO3				✓		
		CO4			<b>~</b>	✓		
Courses Description:	This course gives cognitive experience to students in learning mathematics. Students are given cognitive experience through axiomatic, deductive and logical and systematic reasoning to build a model or formula. The reasoning material in mathematics is as follows: number systems, complex numbers, matrices, differentials, and integrals (indeterminate and certain) for functions with one free change. Students after attending this lecture are expected to be able to apply these concepts in learning engineering concepts in courses in electrical engineering study programs.							
	outco	omes, nam ral skills	nely attain	ment learr	ning achiev	ure all lea vements (0 d special	CO1),	
Assessments	<ol> <li>Attitude assessment is carried out at each meeti observation techniques and / or self-assessment u assumption that basically every student has a good The student is given a value of a very good attitude or if it shows significantly better or less good attitude com the attitude of students in general. The results of the assessment are not a component of the student's fin but rather as one of the graduation requirements. Stud graduate from this course if at least have a good Attitude assessment also considers the activeness of following lectures.</li> </ol>						g the itude. good red to titude rade, ts will itude.	
	2. Final scores include the results of the assessment of knowledge, general skills, and special skills obtained from individual assignments, group assignments, presentations, quizzes, insert tests, and final semester examinations with the following guidelines.						from tions,	
	The final mark will be weight as follow:							

	No	со	Assessment Object	Assessment Technique	Weight	
	1	CO2	Atitude (attendance, activity, discipline, honesty)	Observation	10%	
		CO3, CO4	Individual Task	Written Test	15%	
		004	Group Task	Written test	15%	
			Midterm	Written test	20%	
			Final Exam	Written test	40%	
				Total	100%	
Forms of media:	Board	d, LCD P	rojector, Laptop/Comp	uter		
Literature:	<ol> <li>Ayres, F,Jr. (1981), <i>Calculus</i> 2/ed, SI, SNP, Singapore.</li> <li>Stroud, K.A. <i>Matematika Teknik</i></li> <li>Mizrahi, Abe &amp; Sullivan, Michael. <i>Calculus and Analytic Geometry</i></li> <li>Spiegel, Murray R. <i>Matrices</i></li> </ol>					
Date of revision	29 A	ugust 20	18			



#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Physics
Module level, if applicable:	Undergraduate
Code:	KTF6206
Sub-heading, if applicable:	-
Classes, if applicable:	-
Semester:	1 <sup>st</sup>
Module coordinator:	Muhfizaturrahmah, S.T., M.Eng
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Lecturing
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.

Credit points:	2
Prerequisites course(s):	-
	After taking this course the students have ability to:
	ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics.
Expected learning outcomes:	ELO3 Can carry out work in accordance with the professional field of expertise both individually and in teams.
	ELO4 Master in basic sciences and principles of electric
	ELO7 Able to manage vocational education and training in the field of Electrical Engineering by utilizing information and communication technology.
Course Outcomes	<ul> <li>CO1 Internalize academic values, norms and ethics.</li> <li>CO2 Demonstrates responsibility for work in their area of expertise independently.</li> <li>CO3 Knowledge of the principles of Mathematics and Physics related to the principles of electricity.</li> <li>CO3.1 Mastering the quantities and units used in the field of electrical physics.</li> <li>CO3.2 Mastering the calculation of vector quantities.</li> <li>CO4 Knowledge of law and the basic theory of electricity.</li> <li>CO4.1 Mastering the electric field concept.</li> <li>CO4.2 Mastering the concept of electrical potential.</li> <li>CO4.3 Mastering the principle of capacitance.</li> <li>CO4.4 Mastering the concept of Electric Current and Direct Current (DC) Electrical Circuits.</li> <li>CO4.5 Mastering theories about magnetic fields.</li> <li>CO4.6 Know the sources of the magnetic field and the laws that relate to it.</li> <li>CO4.7 Mastering the process of magnetic inductance.</li> <li>CO5 Analyze and solve technical problems routinely related to electric power engineering by applying the principles of Mathematics, Physics and Chemistry.</li> <li>CO5.1 Able to use the principle of DC parallel series circuits in analyzing simple electrical circuits.</li> </ul>

			ELO1	ELO3	ELO4	ELO7			
		CO1	~						
ELO and CO mapping		CO2		✓					
		CO3				✓			
		CO4			✓	✓			
		CO5			✓	✓			
Courses Description:	Engineering Physics courses include a review of basic science, namely quantities, units, vectors and physics course material related to the electrical field, namely electric fields, electric potential, capacitance, electric currents and direct current (DC) circuits, magnetic fields, sources source of magnetic fields and magnetic induction.								
Assessments	<ul> <li>magnetic induction.</li> <li>1. Assessment is carried out to measure all learning achievements, namely attainment learning achievements (CO1), general skills (CO2), knowledge (CO3), and special skills (CO4 and CO5).</li> <li>2. Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if it shows significantly better or less good attitude compared to the attitude of students in general. The results of the attitude assessment are not a component of the student's final grade, but rather as one of the graduation requirements. Students will graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness of students following lectures.</li> <li>3. Final grades include the results of the assessment of knowledge, general skills, and special skills obtained from individual assignments, group assignments, presentations, quizzes, insert tests, and final semester examinations with the following guidelines.</li> <li>The final mark will be weight as follow:</li> </ul>								
	1	CO1-	<b>Obj</b> Assignme		Technic       1. Accura	асу	20%		
					of answe	r			

		CO5		results				
				2. Written				
			Participation	Observation	15%			
			Attendance	Observation	10%			
			Midterm	1. Accuracy of answer results	25%			
				2. Written				
			Final Exam	1. Accuracy of answer results	30%			
				2. Written				
				Total	100%			
Forms of media:	Board	d, LCD P	rojector, Laptop/Comp	uter				
Literature:	2. E II 3. H 4. S	York: Mc Beiser, A Inc. Halliday, Heh Pant Ketika, Ja Sears, FV	1998, 3000 Solved Pro Graw-Hill Book Compa , 1985, Applied Physic David, dan Robert Res ur Silaban dan Erwin S akarta: Penerbit Erlang V, Sudaryono, PJ, 198 <i>n Bunyi.</i> Jakarta : Per	any. c, New York: Mc snick, 1987, (Per Sucipto). <i>Fisika J</i> ga. 34, (Penyadur) <i>I</i>	Graw-Hill, nterjemah <i>lilid I</i> Edisi			
Date of revision	30 August 2018							



#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Fundamentals of Electrical
Module level, if applicable:	Undergraduate
Code:	EKO6201
Sub-heading, if applicable:	-
Classes, if applicable:	-
Semester:	1 <sup>st</sup>
Module coordinator:	Dr. Edy Supriyadi, M.Pd.
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Student Center Learning
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.

Credit points:	2
Prerequisites course(s):	-
	After taking this course the students have ability to: ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics.
Expected learning outcomes:	ELO3 Can be handled according to the expertise of each team.
	ELO4 Master in basic sciences and principles of electric.
	ELO7 Capable to manage vocational education and training in the field of Electrical Engineering by utilizing information and communication technology.
Course Outcomes	<ul> <li>CO1 Devotion to God Almighty and able to show religious attitude.</li> <li>CO2 Demonstrates a responsible and independent attitude towards the assigned work.</li> <li>CO3 Knowledge of law and the basic theory of electricity.</li> <li>CO3.1 Having knowledge about the basic concepts and laws of electricity.</li> <li>CO3.2 Having knowledge about the elements of electrical circuits.</li> <li>CO3.3 Having knowledge of the methods and theorems of the analysis of unidirectional electric circuit.</li> <li>CO3.4 Having knowledge of the phasor concept.</li> <li>CO3.5 Having knowledge about single-phase alternating electrical circuits.</li> <li>CO3.6 Having knowledge about measuring instruments and how to read them.</li> <li>CO4 Students have comprehensive knowledge about the phasor concept and its application in a series of alternating one-phase sources, selecting a measuring instrument and analyzing the results of measurements of electrical quantities.</li> <li>CO4.1 Able to analyze the basic concepts and laws of electricity.</li> <li>CO4.2 Being able to analyze the elements of the electrical circuit.</li> <li>CO4.3 Able to apply the methods and theorems of electrical circuit.</li> <li>CO4.4 Able to apply the electric circuit.</li> <li>CO4.5 Able to apply the electric al circuit analysis in a single-phase alternating electric circuit.</li> <li>CO4.5 Able to apply the electrical circuit analysis in a single-phase alternating electric circuit.</li> <li>CO4.6 Able to measure electric al quantities using a measuring instrument and analyze the measurement results.</li> </ul>

		ELO1	ELO2	ELO4	ELO5	ELO6		
			ELUZ	ELU4	ELUS	ELUO		
ELO and CO mapping	CO1	<b>√</b>						
Leo and co mapping	CO2		✓					
	CO3			✓		✓		
	CO4 <							
Courses Description:	Electrical Basic Course will develop student competence on the concepts and basic laws of electricity, electrical circuit elements, methods and theorems of unidirectional source circuit analysis, phasor concepts and their application in a series of alternating single-phase sources, selecting a measuring instrument and analyzing the results of measuring electric quantities . Lectures are carried out with a variety of approaches that fit the context of the material and the potential of students, including: contextual, cooperative, and problem based learning that leads to student center learning. Continuous assessment is carried out on a competency basis and harmonized with lecture activities.							
Assessments	achievem (CO1) and 1. Attitude observation assumption The stude if it shows the attitude assessment but rather graduate Attitude as following I 2. Final e attitudes, assignme	d (CO2), kr e assessm on techniq on that bas nt is given significant le of stude ent are not as one of t from this ssessment ectures. grades inco knowledg nts, grou Exams, an	hely attain howledge ( ent is carr ues and / sically even a value of ly better or nts in gen a compon the gradua course if also consi clude the e, and s up assign	iment lea CO3), and ied out at or self-as ry student a very good less good eral. The r ent of the tion require at least ha iders the a results of kills obtain ments,	skills (CO each mee sessment has a goo d attitude co results of t student's f ements. St ave a goo ctiveness o the asse ned from presentatio	All initial devices and the attitude in all grade, sudents will attitude. In structure in all grade, sudents will attitude in attitude in attitude in attitude in all grade, sudents will attitude. In the attitude in attitude in attitude in attitude in attitude in attitude. In the attitude in at		

					•		
	No	со	Assessment Object	Assessment Technique	Weight		
	1	CO2	Self-Assessment	Observation	5%		
		CO2, CO3	Task	PBL Rubric	35%		
		003	Midterm	Written test	30%		
			Final Exam	Written test	30%		
	Total 100%						
Forms of media:	Board, LCD Projector, Laptop/Computer						
Literature:	<ol> <li>Alexander Sadiku. 2007. Fundamentals of Electric Circuits. New York: McGraw-Hill International Edition.</li> <li>Ridsdale. (1984) Elecetrical Circuits for Engineering. New York: McGrawHill.</li> <li>Sudjana Sapi'ie. Alat Ukur dan Pengukuran Listrik. Jakarta: Pradnya Paramita.</li> <li>Mohamad Ramdani. 2008. Rangkaian Listrik. Jakarta: Erlangga.</li> <li>Mussama, Imam Mustholiq. Pegangan Kuliah Dasar Listrik, Listrik DC dan AC. Yogyakarta: FT UNY (tidak dipublikasikan).</li> <li>Mussama, Imam Mustholiq. Pengukuran Listrik, Jilid 1 dan Jilid 2. Yogyakarta: FT UNY (tidak dipublikasikan).</li> <li>Budiono Mismail. 1995. Rangkaian Listrik, Jilid Pertama. Bandung: ITB</li> </ol>						
Date of revision	29 Agustus 2018						



#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Electronics
Module level, if applicable:	Undergraduate
Code:	EKO6202
Sub-heading, if applicable:	-
Classes, if applicable:	-
Semester:	1 st
Module coordinator:	Sardjiman Djojo Pernoto, M.Pd
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Lecturing
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.

Credit points:	2								
Prerequisites course(s):	-	-							
Expected learning outcomes:	ELO <sup>2</sup> ELO <sup>2</sup>	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics.</li> <li>ELO3 Can be handled according to the expertise of each team.</li> <li>ELO4 Master in basic sciences and principles of electric.</li> <li>ELO5 Mastering work standards, work methods, work implementation, and testing in the field of electric power engineering or industrial automation</li> </ul>							
Course Outcomes	<ul> <li>CO1 Devotion to God Almighty and able to show religious attitude</li> <li>CO2 Demonstrates a responsible and independent attitude towards the assigned work.</li> <li>CO3 Students can develop (plan, make analog electronic circuits and analyze.</li> <li>CO3.1 Understand the basics and characteristics of analog electronics, and their applications.</li> <li>CO4 Able to present the results of series analysis.</li> <li>CO4.1 Plan, make analog electronic circuits and analyze.</li> <li>CO4.2 Able to present the results of series analysis.</li> </ul>								
			ELO1	ELO3	ELO4	ELO6			
		CO1	✓						
ELO and CO mapping		CO2		✓					
		CO3			✓	✓			
		CO4			<ul> <li>✓</li> </ul>	✓			
Courses Description:	This course discusses and practices the basics of analog electronics, the characteristics of electronic components, rectifier circuits, transistor circuits as switches and amplifiers, operational amplifiers and wave generator circuits.								

	<ol> <li>Assessment is carried out to measure all learning achievements, namely attainment learning achievements (CO1), general skills (CO2), knowledge (CO3), and special skills (CO4).</li> <li>Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if it shows significantly better or less good attitude compared to the attitude of students in general. The results of the attitude assessment are not a component of the student's final grade, but rather as one of the graduation requirements. Students will graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness of students following lectures.</li> <li>Final grades include the results of an assessment of knowledge, general skills, and special skills obtained from individual assignments, group assignments, presentations, quizzes, Insertion Exams, and Final Semester Exams with the following guidelines.</li> </ol>				
	The f	inal marl	< will be weight as fo	llow:	
Assessments	No	СО	Assessment Object	Assessment Technique	Weight
	1	CO2	Presentation	Observation	10%
		CO3,	Individual Task	a. skill set results	10%
		CO4	Group Task	b. Written	10%
			Quiz		20%
			Midterm		20%
			Final Exam		30%
				Total	100%

Forms of media:	Board, LCD Projector, Laptop/Computer				
	<ol> <li>Robert Boylestad Louis Nashelsky, Electronic Devies and Circuit Theory 7 Edition (1999) Prenties Hall, Inc.</li> </ol>				
	<ol> <li>Hayt Neudeck, Electronic Circuit Analysis n Desaign (1978) Library of Congress Catalog Printied in USA</li> </ol>				
Literature:	<ol> <li>Herman Dwi Suryono, Elektronika: Teori dan Penerapan (1996) Fakultas Pendidikan Teknologi Kejuruan, Institus Keguruan dan Ilmu Pendidikan Yogyakart</li> </ol>				
	<ol> <li>K.F. Ibrahim, Prinsip Dasar Elektronika (1986) PT. MULTI MEDIA Jakarta</li> </ol>				
Date of revision	29 August 2018				



#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Digital Engineering Laboratory Work
Module level, if applicable:	Undergraduate
Code:	EKO6303
Sub-heading, if applicable:	-
Classes, if applicable:	-
Semester:	1 <sup>st</sup>
Module coordinator:	Faranita Surwi, S.T., M.T.
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	250 minutes lectures and 300 minutes structured activities per week.
Teaching and Learning Method	Discussion, Demonstration, and Lecturing
Workload:	Total workload is 227 hours per semester which consists of 250 minutes lectures, 300 minutes structured activities, and 300 minutes self-study per week for 16 weeks.

Credit points:	3	3							
Prerequisites course(s):	-	-							
Expected learning outcomes:	ELO <sup>2</sup> ELO2	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics.</li> <li>ELO2 Demonstrate nationalism, responsibility, and tolerance to both society and environmet</li> <li>ELO4 Master in basic sciences and principles of electric</li> <li>ELO6 Capable to make plans, implement, and evaluate learning in electric power or industrial automation expertise</li> </ul>							
Course Outcomes	<ul> <li>CO1 Devotion to God Almighty and able to show religious attitude</li> <li>CO2 Demonstrates a responsible and independent attitude towards the assigned work</li> <li>CO3 Explain the concept of elementary numbers</li> <li>CO3.1 Understand the basic principles, characteristics, analysis of digital circuits and their applications.</li> <li>CO4 conversion of decimal, binary, octal, and hexadecimal numbers.</li> <li>CO4.1 Arranging a digital circuit and can solve obstacles that occur.</li> </ul>								
			ELO1	ELO2	ELO4	ELO6			
		CO1	<b>~</b>				-		
ELO and CO mapping		CO2		✓					
		CO3			✓	✓	_		
	CO4 🖌 🔨								
Courses Description:	This course discusses and practices basic number concept materials, basic logic gates and expansion gates, boolean algebra, flip-flop circuits, counters, registers, adder-subtractors, ADC-DAC, and decoder-encoders.								

	achie 1), ge (CO 4 1. Att obset assur The s if it sh the a asses but ra gradu Attitu follow 2. Fi	vements eneral sk 4 and O titude as rvation t mption th student is nows sign ttitude o ssment a ather as o uate from de asses ving lectun nal grad	sessment is carried echniques and / or hat basically every s given a value of a ven nificantly better or les f students in genera are not a component one of the graduation n this course if at l ssment also consider ures.	learning achiever ge (CO 3), and sp out at each mee self-assessment tudent has a goo ery good attitude co s good attitude co l. The results of th of the student's fin requirements. St east have a goo rs the activeness co sults of an asses	eting using using the d attitude. or not good ompared to ne attitude inal grade, udents will d attitude. of students
	follow 2. Fi know indivi quizz	ving lectu nal grac ledge, g dual ass es, Insei	ures. des include the res general skills, and s signments, group a rtion Exams, and Fin	sults of an asses pecial skills obta ssignments, pres	ssment of ined from sentations,
		/ing guid	ellnes. will be weight as fol	low:	
Assessments	No	CO	Assessment Object	Assessment Technique	Weight
	1	CO2	Presentation	Observation	10%
		CO3, CO4	Individual Task	a. Skill set results b. Written	10%
			Group Task		10%
			Quiz		20%
			Midterm		20%
			Final Exam		30%
				Total	100%

Forms of media:	Board, LCD Projector, Laptop/Computer							
Literature:	<ol> <li>Ronald J. Tocci, Digital Systems Principles and Applications, Prentice-Hall</li> </ol>							
	<ol> <li>Herlambang, Ariadie Chandra, Lab Sheet Praktik Teknik Digital</li> </ol>							
Date of revision	30 August 2018							



#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Computer Programming Laboratory Work
Module level, if applicable:	Undergraduate
Code:	EKO6204
Sub-heading, if applicable:	-
Classes, if applicable:	-
Semester:	1 <sup>st</sup>
Module coordinator:	Drs. Mutaqin, M.Pd.,M.T.
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	200 minutes lectures and 240 minutes structured activities per week.
Teaching and Learning Method	Lecturing
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.

Credit points:	2								
Prerequisites course(s):	-								
Expected learning outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics.</li> <li>ELO2 Demonstrate nationalism, responsibility, and tolerance to both society and environmet</li> <li>ELO4 Master in basic sciences and principles of electric</li> <li>ELO5 Master in work standards, work methods, work implementations, and testing in electric power or industrial automation expertise.</li> <li>ELO6 Capable to make plans, implement, and evaluate learning in electric power or industrial automation expertise.</li> </ul>								
Course Outcomes	<ul> <li>CO1 Devotion to God Almighty and able to show religious attitude.</li> <li>CO2 Demonstrates a responsible and independent attitude towards the assigned work.</li> <li>CO3 Students have the ability to identify problems, analyze needs, design, apply and test simple computer programming.</li> <li>CO4 Students master the basics of programming, can use C ++ in solving problems, and create projects based on C ++ programming.</li> </ul>								
		ELO1	ELO2	ELO4	ELO5	ELO6			
	CO1	✓							
ELO and CO mapping	CO2		✓						
	CO3			~	✓	~			
	CO4			✓	~	~			
Courses Description:	This course will discuss, study, and practice algorithms and computer programming. The programming language used is an intermediate programming language (C ++ programming language). The material that will be given in this course includes: programming, basic programming, being able to use								

	C ++ in solving problems, and making projects based on C ++ programming. Lectures are conducted using the student center. Learning strategies, theory delivery, teaching, assignments, and presentations. The evaluation system uses assignments and tests.						
	<ul> <li>The assessment is carried out to measure all learn achievements, namely attainment learning achievements 1 and CO 2), knowledge and skills (CO 3 and CO 4).</li> <li>1. Attitude assessment is carried out at each meeting u observation techniques and / or self-assessment using assumption that basically every student has a good attitut. The student is given a value of a very good attitude or not g if it shows significantly better or less good attitude compare the attitude of students in general. The results of the attituassessment are not a component of the student's final grabut rather as one of the graduation requirements. Students graduate from this course if at least have a good attitude following lectures.</li> <li>2. Final grades include the results of an assessment knowledge, general skills, and special skills obtained findividual assignments, group assignments, presentating quizzes, Insertion Exams, and Final Semester Exams with</li> </ul>						
	follow	ing guid					
Assessments	No	СО	Assessment Object	Assessment Technique	Weight		
	1	CO2	Presentation	Obseervation	10%		
		CO3 CO4	Individual Task	a. Skill set results b. Written	10%		
		CO5	Group Task		10%		
			Quiz		20%		
			Midterm		20%		

	Final Exam	30%				
		Total 100%				
Forms of media:	Board, LCD Projector, Laptop/Cor	nputer				
	<ol> <li>Bambang Hariyanto, Ir. (1997). Sistem Operasi, Bandung : Informatika</li> </ol>					
	<ol> <li>Yogiyanto. (1995) Turbo C++I V.5. Yogyakarta: Andi Offset</li> </ol>					
Literature:	<ol> <li>Abdul Kadir, (1999). Bahasa C++. Yogyakarta: Andi Offset</li> </ol>					
	n Pemrograman.					
Date of revision	30 August 2018					



## Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Engineering Drawing Laboratory Work
Module level, if applicable:	Undergraduate
Code:	EKO6205
Sub-heading, if applicable:	-
Classes, if applicable:	-
Semester:	1 <sup>st</sup>
Module coordinator:	Dr. phil Nurhening Yuniarti, S.Pd.,M.T.
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	200 minutes lectures and 240 minutes structured activities per week.
Teaching and Learning Method	Demonstration, Simulation.
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.

Credit points:	2
Prerequisites course(s):	-
Expected learning outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics.</li> <li>ELO3 Can carry out work in accordance with the professional field of expertise both individually and in teams.</li> <li>ELO4 Master in basic sciences and principles of electric</li> <li>ELO5 Master in work standards, work methods, work implementations, and testing in electric power or industrial automation expertise.</li> <li>ELO6 Capable to make plans, implement, and evaluate learning in electric power or industrial automation expertise</li> </ul>
Course Outcomes	<ul> <li>CO1 Devotion to God Almighty and able to show religious attitude.</li> <li>CO2 Demonstrates a responsible and independent attitude towards the assigned work.</li> <li>CO3 Demonstrates responsibility for work in their area of expertise independently.</li> <li>CO4 Mastery of drawing with pictorial techniques.</li> <li>CO4.1 Understanding the concepts and functions of technical drawings.</li> <li>CO4.2 Mastery of drawing with pictorial techniques.</li> <li>CO4.3 Mastery of symbols used in the field of electrical engineering.</li> <li>CO5 Mastery of symbols is used in the field of electrical engineering.</li> <li>CO5.1 Mastery of the switch image.</li> <li>CO5.2 Mastery of drawing power installations.</li> <li>CO5.3 Mastery of basic commands of Autocad software.</li> <li>CO6 Facilitating, evaluating, implementing learning and learning outcomes in a professional manner, as well as community partnerships within the framework of vocational education in carrying out duties as a teaching profession</li> <li>CO6.1 Mastery of further commands of Autocad software</li> <li>CO6.2 Mastery of drawing PCB designs with software</li> </ul>

		ELO1	ELO3	ELO4	ELO5	ELO6		
	CO1	✓						
	CO2		✓					
ELO and CO mapping	CO3			✓		~		
	CO4				✓	<ul> <li>Image: A start of the start of</li></ul>		
	CO5				✓	<ul> <li>✓</li> </ul>		
	CO6				✓	~		
Courses Description:	This course will provide knowledge and drawing skills that include: understanding and function of technical drawings, technical drawing requirements, pictorial drawings, electrical and electronic engineering symbols, drawing switches and maintenance diagrams, lighting and power installations, control circuits carried out manually with using drawing equipment or using Autocad and PCB Wizard software.							
Assessments	<ul> <li>Assessment is carried out to measure all learning achievements, namely attainment of attitudes, general skills, knowledge, and skills</li> <li>1. Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if it shows significantly better or less good attitude compared to the attitude of students in general. The results of the attitude assessment are not a component of the student's final grade, but rather as one of the graduation requirements. Students will graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness of students following lectures.</li> <li>2. Final grades include the results of an assessment of knowledge, general skills, and special skills obtained from individual assignments, group assignments, presentations, quizzes, Insertion Exams, and Final Semester Exams with the following guidelines.</li> </ul>							

	The f	The final mark will be weight as follow:					
	No	No CO Assessmen Object		Assessment Technique	Weight		
	1	CO1– CO12	Assignment	Practicum report	40%		
			Midterm	Practicum	20%		
			Final Exam	Practicum	30%		
			Attendance	Documentation	10%		
				Total	100%		
Forms of media:	Board	Board, LCD Projector, Laptop/Computer					
Literature:	2. h 3 4. C						
	5. Scrhriever, Errol G. (1984). Electrical Drafting. Prer Hall, Inc.						
Date of revision	29 Au	29 August 2018					



## Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Mechanical Technology Laboratory Work
Module level, if applicable:	Undergraduate
Code:	EKO6206
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	1 <sup>st</sup>
Module coordinator:	Toto Sukisno, S.Pd., M.Pd.
Lecturer(s):	<ol> <li>Drs. Sunomo, M.T.</li> <li>Drs. Mutaqin, M.Pd.,M.T.</li> </ol>
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Discussion, Demonstration, Lecturing, Practice
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.

Credit points:	2						
Prerequisites course(s):	-						
	After taking this course the students have ability to:						
		Demonstrate piousness to God, high loyalty to cademic values, norms, and ethics					
Expected learning		an carry out work in accordance with the professional ield of expertise both individually and in teams.					
outcomes:	ir	Master in work standards, work methods, work mplementations, and testing in electric power or ndustrial automation expertise.					
	le	Capable to make plans, implement, and evaluate earning in electric power or industrial automation expertise					
	CO1	Devoted to God Almighty and able to show a religious attitude and rusty with gratitude for the gifts that have been owned.					
	CO2	Students actively participate, take responsibility, and have the motivation to develop themselves.					
Course Outcomes	CO3	Students are able to work in a professional manner by paying attention to and following aspects of work health, safety and security.					
	CO3.1	Knowing about bench work theory such as; file, saw, cut and bend.					
	CO4	Having the ability to communicate effectively, think critically and make the right decisions.					
	CO4.1	Able to carry out work benches such as: file, sawing, cutting, and bending.					

		E	ELO1	ELO2	ELO4	4 ELO5	ELO6	
ELO and CO mapping	СС	01	✓					
	cc	)2		✓				
	СС	)3					<b>~</b>	
	cc	94			✓	~		
Courses Description:	<ul> <li>Mechanical Technology Practice Lectures will equip capable and skilled students to use bench work equipment such as: file, sawing, cutting, and bending the plate carefully and considering K3 asphalt. Students are also able to apply knowledge and skills from exercises to production.</li> <li>1. Assessment is carried out to measure all learning</li> </ul>							
	<ul> <li>achievements, namely attainment learning achievements (CO1), general skills (CO2), knowledge (CO3), and special skills (CO4 and CO5).</li> <li>2. Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the</li> </ul>							
Assessments Assessments assessment are not a component of the student but rather as one of the graduation requirements following lectures.						good attitude c bod attitude co ne results of th he student's f quirements. St t have a goo	or not good ompared to he attitude inal grade, udents will d attitude.	
	3. Final grades include the results of an assessment of knowledge, general skills, and special skills obtained from individual assignments, group assignments, presentations, quizzes, Insertion Exams, and Final Semester Exams with the following guidelines.							
	The f	inal mai	k will b	e weight as	s follow:	:		
	No	СО	A	ssessmen Object	it /	Assessment Technique	Weight	
	1 CO2– Presentation Observation 10							

		CO6	Individual Task	Occuration result progam	10%	
			Group Task	written test	10%	
			Quiz	written test	20%	
			Mid	written test	20%	
			Final Exam	written test	30%	
				Total	100%	
Forms of media:	Board, LCD Projector, Laptop/Computer					
Literature:	<ol> <li>Gerling, Henrich, 1974, All About Machine Tool, Willey Eastern</li> <li>De Meyere, 1975, Work Preparation Planing, MIDC Indonesia</li> </ol>					
Date of revision	10 August 2018					



## Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	English
Module level,if applicable:	Undergraduate
Code:	MKU6211
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	1 <sup>st</sup>
Module coordinator:	Dr. phil. Nurhening Yuniarti, M.T
Lecturer(s):	1. Muhfizaturrahmah, S.T., M.Eng
Language:	English
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Discussion, Demonstration, Lecturing, Practice
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.

Credit points:	2						
Prerequisites course(s):	-						
	After taking this course the students have ability to:						
		emonstrate piousness to God, high loyalty to cademic values, norms, and ethics					
Expected learning		apable to perform professional works in his/her field of xpertise both individual and team works					
outcomes:	in	lastering work standards, work methods, work nplementation, and testing in the field of electric power ngineering or industrial automation					
		apable to develop a vocational education innovation nd publish scientific paper					
	CO1	Internalize academic values, norms and ethics.					
	CO2	Internalize the spirit of independence, struggle, and entrepreneurship.					
	CO3	Knowledge of the preparation of scientific works including work reports in accordance with scientific procedures based on data and information analysis.					
	CO3.1	Mastering the procedures for writing a script in English.					
Course Outcomes	CO3.2	Mastering scientific presentation techniques in English					
	CO4	Apply logical, critical, systematic, and innovative thinking in the context of developing or implementing science and/ or technology in accordance with their area of expertise.					
	CO4.1	Able to understand scientific writing in English.					
	CO4.2	Able to understand scientific conversation in English.					
	CO4.3	Able to speak in English.					
	CO4.4	Able to make writing in English.					

		<b>T</b>		-	T	T	
		ELO	D1	ELO2	ELO3	ELO8	ELO9
	СС	1 🗸					
ELO and CO mapping	СО	2		✓			
	СС	3			~		
	СС	94			✓		
Courses Description:	Readi	ng, Speal h especia	king,	Writing a	nd Gramr	te students nar abilities ical engine	s in using
Assessments	ac (C sk 2. At ob as at or at re th re le cc 3. Fi kr in ac fo	chievemen CO1), gene cills (CO4), ttitude ass oservation sumption titude. The not good titude com sults of th e student's quirement ast have onsiders th nal grade nowledge, dividual as ctiveness, llowing gu	ts, n eral s essn tech that stuc l if if pare e att s fina s. St a g e ac s in gene ssign atter idelir	amely atta kills (CO2) nent is car niques and basically dent is give shows si d to the att itude asse l grade, bu udents wil ood attitu tiveness of clude the eral skills, a ments, gro ndance, ar	ainment le , knowledg ried out a d / or self-a e every s an a value o ignificantly itude of stu ssment ar trather as l graduate de. Attitud f students results o and specia oup assign nd Final E	one of the from this o de assess following le	eting using t using the s a good od attitude less good eneral. The nponent of graduation course if at ment also ectures. ssment of ained from sentations,
				ssessmer Object		essment chnique	Weight
	1	CO1,2,4	As	signment	of the		30%

				Written.	
		CO1,2,3	Presentation	Observation	15%
			Participation	Observation	15%
			Attendance	Observation	10%
			Final Exam	The suitability of the task with the rules of the English language. Written.	30%
				Total	100%
Forms of media:	Board, LCD Projector, Laptop/Computer				
Literature:	<ol> <li>Betty S. Azar. Understanding and using english Grammar. Pearson Educaation. NewYork. USA. 2002</li> </ol>				
Date of revision	10 August 2019				





# Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Pancasila
Module level,if applicable:	Undergraduate
Code:	MDU6208
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	2 <sup>nd</sup>
Module coordinator:	Suripno, SH., M.Pd.
Lecturer(s):	MKU Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	The form of learning is in the form of lectures, which consist of 100 minutes of face-to-face activities per week per semester; (2) structured assignment activities 120 minutes per week per semester; and (3) 120 minutes of independent activities per week per semester.
Teaching and Learning Method	Demonstration, Simulation, and Discussion
Workload:	Total workload is 26 hours 40 minutes of face-to-face activities per semester

Credit points:	2			
Prerequisites course(s):	-			
Expected learning outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, practice the values, norms, and academic ethics.</li> <li>ELO2 Demonstrate nationalism, responsibility, and tolerance to both society and environmet</li> </ul>			
Course Outcomes	attitude, hor CO2 Acting as pu- having natio the country a CO2.1 Analyzing a Basis for the CO2.2 Analyzing a foundation. CO3 Contribute t nation, and s on Pancasila CO3.1 Explain and	nd Becoming Panca e Development of Kno and evaluating Pan to improving the qua state life the progress	ens of the country, of responsibility to asila Lifestyle as a owledge. casila as a state ality of community, of civilization based	
		ELO1	ELO2	
FLO and CO manning	CO1	✓		
ELO and CO mapping	CO2		✓	
	CO3	✓		
Courses Description:	This lecture discusses the foundation and objectives of Pancasila Education, Pancasila in the historical context of the struggle of the Indonesian, Pancasila as a philosophical system, Pancasila as political ethics and national ideology, Pancasila in the context of the R.I and Pancasila state administration as a paradigm of life in society, nation and state			

	achi (CO Fina kno indi quiz	evements, 3). al grades i wledge, ger vidual assig	nt was carried out namely attitude atta nclude the results neral skills, and spe nments, group ass ests, and final semes nes	ainment (CO1) of the assess ecial skills obtair signments, prese	, (CO2), ment of ned from entations,
	No	СО	Assessment Object	Assessment Technique	Weight
Assessments	1	CO1	Attitude (presence, activity, discipline, honesty)	Observation	10%
	2	CO2-CO3	Individual assignment	Article, Presentations and Papers	15%
			Group Assignment	Article, Presentations and Papers	15%
			Midterm	Written Test	20%
			Final Exam	Written Test	40%
				Total	100%
Forms of media:	Boa	rd, LCD Proj	ector, Laptop/Comp	uter	
Literature:	2. 3. 4. 5. 6. 7.	Tinggi. Yogy Yudi Latif, Rasionalitas Latif, Yudi. ( Perbuatan. Pancasila. ) Franz Magr Gramedia P Bahar, Saa Risalah Sic Agustus 194 Ali, As'ad Kemaslahat Ismail, Fais Agama, V Pancasila.Y	s, dan Aktualitas. Jak 2012). Mata Air Kete Bandung: Mizan. Ka Yogyakarta: Paradigr his-Suseno. (2003). Pustaka Utama. Cet. froedin & Hudawat lang-sidang BPUPK 45. Jakarta: Sekretar Said. (2009) Ne can Bersama. Jakarta cal. (1999). Ideologi	Paripurna: His carta: PT Gramed ladanan. Pancas aelan. (2004). Pe na. Etika Politik. Jak Ke-7. ci, Nanie (peny). CI – PPKI 28 M iat Negara RI egara Pancasila a: LP3ES Hegemoni dan an Kreatif Isla cana. sila Versi Orde B	storisitas, lia ila dalam endidikan arta: PT. (1998). fei – 22 a, Jalan Otoritas am dan Baru dan

	<ol> <li>A. Ubaidillah &amp; Abdul Rozak. (2013). Pendidikan Kewarganegaraan: Pancasila, Demokrasi,HAM,dan Masyarakat Madani. Jakarta: ICCE UIN Jakarta.</li> <li>Undang-Undang Dasar RI Tahun 1945 (Setelah Amandemen I-IV).</li> </ol>
Date of revision	18 August 2018



# Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Education Management
Module level,if applicable:	Undergraduate
Code:	MDK6203
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	2 <sup>rd</sup>
Module coordinator:	Dr. phil. Nurhening Yuniarti, M.T
Lecturer(s):	1. Dr. Cepi Safruddin Abdul Jabar, M.Pd
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	150 minutes lectures and 180 minutes structured activities per week.
Teaching and Learning Method	Discussion, Demonstration, Lecturing, Practice
Workload:	Total workload is 136 hours per semester which consists of 150 minutes lectures, 180 minutes structured activities, and 180 minutes self-study per week for 16 weeks.

Credit points:	3				
Prerequisites course(s):	-	-			
Expected learning outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics</li> <li>ELO6 Capable to make plans, implement, and evaluate learning in electric power or industrial automation expertise</li> </ul>				
Course Outcomes	<ul> <li>expertise</li> <li>CO1 Devoted to God Almighty and able to show a religious attitude, honest and patient.</li> <li>CO2 Internalize academic values, norms and ethics.</li> <li>CO3 Apply education management to schools, education and training institutions in the field of Electrical Engineering.</li> <li>CO3.1 Applying the planning process (planning) in the management of vocational education in schools, education and training institutions in the field of Electrical Engineering.</li> <li>CO3.2 Applying the organizing process (organizing) in the management of vocational education in schools, training and training institutions in the field of Electrical Engineering.</li> <li>CO3.3 Implement a leadership process (leading) in the management of vocational education in schools, training and training institutions in the field of Electrical Engineering.</li> <li>CO3.4 Implement a controlling process in the management of vocational education and training institutions in the field of Electrical Engineering.</li> </ul>				
		ELO1	ELO6		
	CO1	✓			
ELO and CO mapping	CO2	✓			
	CO3		<b>v</b>		

Courses Description:	This Education Management course provides knowledge in the management of educational organizations (Vocational High Schools, Vocational Education and Training Institutions) which includes planning, organizing, leadership, and controlling human resources independently. effective and efficient so that educational organization goals are achieved. This lecture is carried out using student centered learning strategies (student center learning) by utilizing technology as a learning resource. Assessment of lectures uses three elements, namely: active participation in the classroom, communication of interactions in presentations, and individual competency tests. The main studies in this course include: Strategic Planning, School Based Management, Management Information Systems in Education, Transformational and Transactional Leadership, Learning Leadership (Instructional Leadership), Assurance Systems Internal Quality (SPMI), Implementation of Integrated Quality Management (Total Quality Management), ISO 9001: 2015 Standard Quality Management System, Application of Balance Scorecard, and Implementation of Quality Control Groups
Assessments	<ol> <li>The assessment is carried out to measure all learning outcomes, namely attitudes learning achievements (CO 1 and CO 2), and special skills (CO 3)</li> <li>Attitude assessment is carried out at each meeting by using the method of observation and / or self-assessment with the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if the student shows significantly better or less good attitude compared to the attitude of students in general. The results of the attitude assessment do not become a major component of the student's final grade, but rather as one of the graduation requirements. Students are declared to graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness of students in attending lectures.</li> <li>Final scores include the results of attitude assessment, special skills obtained from individual assignments, group assignments, presentations, with the following guidelines</li> </ol>

	No	со	Assessment Object	Assessment Technique	Weight
	1	CO1 and CO 2	a. Active in class b. Duty c. Discussion d. Presentation	<ul><li>a. Observation</li><li>b. Rubric</li><li>c. Observation</li><li>d. Rubric</li></ul>	20%
	2	CO 6	a. Presentation b. Discussion	a. Rubric b. Observation	80%
				Total	100%
Forms of media:	Board	d, LCD P	Projector, Laptop/Con	nputer	
Literature:	<ul> <li>Board, LCD Projector, Laptop/Computer</li> <li>11. B. Suryosubroto. 2004. Manajemen Pendidikan d Sekolah. Jakarta: Rineka Cipta.</li> <li>12. Hadari Nawawi. 1981. Administrasi Pendidikan. Jakarta: Gunung Agung.</li> <li>13. Hartati Sukirman, et all. 1998. Adminstrasi dan Supervis Pendidikan. Yogyakarta: UPP IKIP Yogyakarta</li> <li>14. Oteng Sutisna. 1989. Administrasi Pendidikan: Dasar Teoritis Untuk Praktek Profesional. Bandung: Angkasa.</li> <li>15. Made Pidarta. 1986. Pemikiran Tentang Supervis Pendidikan. Surbaya: Sarana Press.</li> <li>16. Soekarto Indrafachrudi. 1994. Mengatur Bagaimana Memimpin Sekolah yang Baik. Jakarta: Ghalia Indonesia.</li> <li>17. Soewadji Lazaruth. 1988. Kepala Sekolah dar tanggungjawabnya. Yogyakarta: Kanisius.</li> <li>18. Wayne K. Hoy &amp; Cecil G.Miskel. 2013. Educationa Administrator: Theory, Research and Practice 4<sup>th</sup> Ed. New York: McGraw Hill, Inc.</li> <li>19. John Wales &amp; Joseph Bondi. 1986. Supervision: A Guide to Practice 2<sup>nd</sup>. Colombus: Charles E. Merril Publishing Company.</li> <li>20. Stephen Murgatroyd and Colin Morgan. 1993. Tota Quality Management and the School. Buckingham- Philadelphia: Open University Press.</li> <li>21. Thomas J. Segiovani. 1988. Supervision of Teaching USA: ASCD.</li> </ul>				n. Jakarta: Supervisi an: Dasar ngkasa. Supervisi Bagaimana ndonesia. Dah dan ducational th Ed. New n: A Guide Publishing 993. Total ckingham-
Date of revision	10 Au	ugust 20	18		



## Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Mathematics Engineering
Module level, if applicable:	Undergraduate
Code:	EKO6307
Sub-heading, if applicable:	-
Classes, if applicable:	-
Semester:	2 <sup>nd</sup>
Module coordinator:	Drs. Nur Kholis, M.Pd.
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	150 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Lecturing
Workload:	Total workload is 104 hours per semester which consists of 150 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.

Credit points:	3
Prerequisites course(s):	-
	After taking this course the students have ability to:
	ELO1 Demonstrate piousness to God, practice the values, norms, and ethics.
Expected learning outcomes:	ELO3 Capable to perform professional works in his/her field of expertise both individual and team works
	ELO4 Master in basic sciences and principles of electric
	ELO7 Capable to manage vocational education and training of electrical engineering expertise by utilizing information and communications technology.
	CO1 Devotion to God Almighty and able to show religious attitude.
	CO2 Demonstrates a responsible and independent attitude towards the assigned work.
	CO3 Mastering knowledge about the principles of Mathematics and Physics related to the principles of electricity
	CO3.1 Understanding function's differential and integral with two free changer or more.
	CO3.2 Understanding vector analysis.
	CO3.3 Understanding Order 2 and 3 Linear Differential Equations.
Course Outcomes	CO3.4 Understanding Laplace Transforms and Laplace Transform Inversions.
	CO4 Analyze and solve technical problems related to electrical engineering by applying the principles of Mathematics.
	CO4.1 Solve differentials and integrals for polynomial, trigonometric, and exponential equations.
	CO4.2 Solve ordinary differential equations and apply ordinary differential equations to the field of electrical engineering.
	CO4.3 Solve linear differential equations and apply linear differential equations to the field of electrical engineering.
	CO4.4 Solve Laplace transform and inverse derived from a problem in the field of electrical engineering.

		ELO1	ELO3	ELO4	ELO7	
			LLUJ	LLO4		
ELO and CO mapping	CO1	~				
	CO2		~			
	CO3			$\checkmark$		
	CO4				✓	
Courses Description:	This course gives cognitive experience to students in learning mathematics. Students are given cognitive experience through axiomatic, deductive and logical and systematic reasoning to build a form of certainty. The reasoning materials in this engineering mathematics course are: differential and integral for functions with two (2) or more changes, vector analysis, ordinary differential equations and linear differential equations, and the basics of Laplace transformations, which will be applied in engineering electro. Lectures are carried out using the student centered learning approach. Competency-based assessment involves active participation, and communication of interactions between individuals and groups.					
Assessments	<ul> <li>The assessment was carried out to measure all learning achievements, namely attitude attainment (CO1) and (CO2), knowledge (CO3) and skills (CO4).</li> <li>1. Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if it shows significantly better or less good attitude compared to the attitude of students in general. The results of the attitude assessment are not a component of the student's final grade, but rather as one of the graduation requirements. Students will graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness of students following lectures.</li> <li>2. Final grades include the results of the assessment of knowledge, general skills, and special skills obtained from individual assignments, group assignments, presentations, quizzes, insert tests, and final semester examinations with the following guidelines.</li> </ul>					

	No	со	Assessment Components	Assessment Technique	Weight	
	1	CO2	Attitude (presence, activity, discipline, honesty)	Observation	10%	
	2	CO3-CO4	a. Individual assignment	Homework	10%	
			<ul> <li>b. Group assignment</li> </ul>	Written Test	10%	
			c. Midterm	Written Test	30%	
			d. Final Exam	Written Test	40%	
				Total	100%	
	2 S 3 N	ÁcBraw-Hill Ir Stroud, K.A. 8 Jakarta: Pene Mizrahi, Abe 8	Jr. 1981 , <i>Calculus</i> 2 International Book Co Booth, Dexter J. 20 Irbit Erlangga. Sullivan, Michael. 1 Inetry. Belmont, Califo	mpany. 03. <i>Matematika</i> 986. <i>Calculus</i> a	a Teknik. and	
Literature:	<ul> <li>Publishing Company.</li> <li>4 Wardiman. 1982. <i>Persamaan Diferensial.</i> FMIPA – UGM: Diktat perkuliahan</li> </ul>					
	5 Spiegel, Murray R. 1981. <i>Vector.</i> Singapore: McBraw-Hill International Book Company.					
	6 Spiegel, Murray R. 1999. <i>Transformasi Laplace</i> . Jakarta: Penerbit Erlangga.					
	7 Spiegel, Murray R. 1992. <i>Matematika Lanjutan untuk</i> Para Insinyur dan Ilmuwan. Jakarta: Penerbit Erlangga.					
Date of revision	29 Ju	ıly 2018				



# Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Electrical Circuit
Module level,if applicable:	Undergraduate
Code:	EKO6308
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	2 <sup>rd</sup>
Module coordinator:	Dr. Edy Supriyadi
Lecturer(s):	1. Eko Prianto,S.Pd.T,M.Eng 2. Mutaqin,M.Pd,MT.
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	300 minutes lectures and 360 minutes structured activities per week.
Teaching and Learning Method:	Discussion, Demonstration, and Lecturing

Workload:	Total workload is 272 hours per semester which consists of 300 minutes lectures, 360 minutes structured activities, and 360 minutes self-study per week for 16 weeks.				
Credit points:	3				
Prerequisites course(s):	-				
	After taking this course the students have ability to:				
	ELO1 Demonstrate piousness to God, practice the values, norms, and academic ethics.				
Expected Learning Outcomes:	ELO3 Capable to perform professional works in his/her field of expertise both individual and team works.				
	ELO4 Master in basic sciences and principles of electric				
	ELO7 Capable to manage vocational education and training of electrical engineering expertise by utilizing information and communications technology.				
	CO1 Devoted to God Almighty and able to show a regius attitude, honest and patient.				
	CO2 Demonstrates a responsible and independent attitude towards the assigned work.				
	CO3 Knowledge of law and the basic theory of electricity.				
	CO3.1 Knowledge about alternating source electrical circuit analysis				
	CO3.2 Knowledge about natural responses and steady state responses				
Course Outcomes:	CO3.3 Knowledge about magnetic couplings CO3.4 Knowledge about the analysis of three-phase electrical circuits				
Course Outcomes:	CO3.5 Knowledge about power factor improvement CO3.6 Knowledge about measuring three-phase quantities				
	CO4 Analyze and solve technical problems routinely related to electric power engineering by applying the principles of Mathematics, Physics and Chemistry.				
	CO4.1 Able to analyze alternating electrical circuits CO4.2 Able to analyze natural responses and steady state responses				
	CO4.3 Able to analyze about magnetic couplings CO4.4 Able to analyze three-phase electrical circuits				
	CO4.5 Able to apply power factor improvements to the electric power system				

	CO4.6 Able to measure the magnitude of three phases and analyze the measurement results.					
			ELO1	ELO3	ELO4	ELO7
		CO1	✓			
ELO and CO mapping:		CO2		✓		
		CO3			✓	
		CO4				✓
Courses Description:	This Electrical Circuit will develop student competencies in the analysis of alternating source circuits, natural responses and steady state responses, magnetic coupling circuits, three-phase circuits, power factor improvements and measurement of three-phase electric quantities, and the application of three-phase circuits in electric power systems. Lectures are carried out with various approaches that are appropriate to the context of the material and the potential of students, including: contextual, cooperative, and problem based learning that leads to student center learning. Continuous assessment is carried out on a competency basis and harmonized with lecture activities.					
Study/exam achievements:	ac kr 1. ob as sti sti cc gr at ac 2. ge as	thievements, owledge (CC Attitude as oservation te sumption the udent is giver gnificantly be udents in ger omponent of aduation req least have a tiveness of s Final grades eneral skills signments,	namely att 3) and skills sessment is echniques a at basically of a value of a tter or less g heral. The res the student' uirements. S good attitude tudents follor include the , and spe group assig	itude attain (CO4). and / or s every studen very good at yood attitude sults of the at students will g attitude as wing lectures results of the cial skills nments, pre	ment (CO1 ut at each elf-assessme thas a goo titude or not g compared to titude assess but rather graduate fror sessment als a e assessment obtained fr sentations, o	e all learning ) and (CO2), meeting using ent using the d attitude. The good if it shows the attitude of sment are not a as one of the n this course if o considers the t of knowledge, om individual quizzes, insert ring guidelines.

	No	СО	Assessment Object	Assessment Technique	Weight		
	1	CO2	Self Assessment	Observation	5%		
	2	CO3-CO4	Assignment	Rubric PBL	35%		
			Midterm	Written Test	30%		
			Final Exam	Written Test	30%		
			Total	•	100%		
Forms of media:	Boar	d, LCD Projecto	r, Laptop/Computer				
	``	York: McGraw-H	ku. 2007. <i>Fundament</i> Hill International Edition) Electrical Circuits for	on.			
	McGrawHill.						
	3. Sudjana Sapi'ie. <i>Alat Ukur dan Pengukuran Listrik</i> . Jakarta Pradnya Paramita.						
Literature:		Mohamad Rai Erlangga.	mdani. 2008. <i>Rar</i>	ngkaian Listrik.	Jakarta:		
	5. Mussama, Imam Mustholiq. <i>Pegangan Kuliah Dasar Listrik, Listrik DC dan AC.</i> Yogyakarta: FT UNY (tidak dipublikasikan).						
	<ol> <li>Mussama, Imam Mustholiq. Pengukuran Listrik, Jilid 1 dan Jilid 2. Yogyakarta: FT UNY (tidak dipublikasikan).</li> </ol>						
		Budiono Misma Bandung: ITB	ail. 1995. <i>Rangkaia</i>	an Listrik, Jilid	Pertama.		
Date of revision:	31 Aı	ugust 2019					



## Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Electronics Practices
Module level,if applicable:	Undergraduate
Code:	EKO6209
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	2 <sup>nd</sup>
Module coordinator:	Drs. Sunomo, M.T.
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	200 minutes lectures and 240 minutes structured activities per week.
Teaching and Learning Method	Discussion, Demonstration, and Lecturing
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.

Credit points:	2	
Prerequisites course(s):	-	
	After tak	king this course the students have ability to:
	ELO1	Demonstrate piousness to God, practice the values, norms, and ethics.
	ELO3	Capable to perform professional works in his/her field of expertise both individual and team works.
Expected learning outcomes:	ELO4	Master in basic sciences and principles of electric
	ELO5	Master in work standards, work methods, work implementations, and testing in electric power or industrial automation expertise.
	ELO7	Capable to manage vocational education and training of electrical engineering expertise by utilizing information and communications technology.
	CO1	Devoted to God Almighty and able to show a regius attitude, honest and patient.
	CO2	Internalize academic values, norms and ethics.
	CO3	Demonstrates a responsible and independent attitude towards the assigned work.
	CO4	Knowledge of law and the basic theory of electricity.
	CO4.1	Linking the electronic theory with the practice that will be taken.
	CO5	Knowledge of the preparation of scientific works including work reports in accordance with scientific procedures based on data and information analysis.
Course outcomes:	CO5.1	Make a report related to bridge diode with capacitor filter and load resistor.
	CO5.2 CO5.3	Make a report related transistor as a switch. Make a report related transistor as a comon emitter amplifier.
	CO5.4	Make a report the operation amplifier as a reversing amplifier and not reverse.
	CO5.5	Make a report the operation amplifier as a wave generator.
	CO5.6	Make an electronic practice report.
	CO6	Knowledge of design, analysis and application of measurement systems related to the quantity and quality of Electric Power Engineering or Industrial Automation.

	re CO6.2 A CO6.3 A CO6.4 A an CO6.5 A CO6.6 A CO7 A pa CO7.1 C vo ex CO7.2 C al	nalyze brid sistor. nalyze trar nalyze trar nalyze ope nalyze ope nalyze ope nalyze elec pply the the arameters onnect an oltmeter, o kplain the f onnects a ternating equencies	nsistors as insistors as insist	switches. common e nplifier as a nplifier as a uits. asurement al paramete e measure th a milliouttons on direction d voltage	emitter. a reversing wave gene t and meas ers. ment resu imeteramp the oscillo al voltage waves a	g amplifier erator. suring lts with a eere, and scope. e waves,
		ELO1	ELO3	ELO4	ELO5	ELO7
	CO1	✓				
	CO2	$\checkmark$				
	CO3		✓			
ELO and CO mapping:	CO4			✓		
	CO5				✓	
	CO6					<ul> <li>✓</li> </ul>
	C07					~
Courses Description:	Electronic Practice lectures are to prove the count of the electronic theory that has been obtained in the Electronics course, and practice the skills to assemble electronic components and measure electrical quantities such as voltage, current and frequency as well as calculating the value of voltage reinforcement. In order to achieve the objectives of this course, the implementation is individual, meaning that each student receives a practicum module, a voltage, current, and oscilloscope and a sine wave signal generator. In practice, each student carries out five practical titles; i.e. a bridge diode as a rectifier with a capacitor filter, a transistor as a switch, a transistor as a amplifier, an operating amplifier as a reversing					

	and not reversing amplifier, and an operating amplifier as a wave generator. The implementation strategy is that each topic is covered in 100 minutes. With this strategy every meeting in 200 minutes, there are a maximum of 10 participants. The implementation is that every participant enters once every two weeks, taking turns or changing his friends. Participants who were not included at the time were assigned by the lecturer to calculate the amount of output requested in the worksheets to compare with the results of the practice, so participants only entered together in their study groups at meetings 1 to 3. Competency evaluation includes timeliness in completing each practicum topic , including assembling, measuring and comparing it with theoretical calculations. Perfect score is obtained if students are able to complete each worksheet from 5 worksheets in accordance with the specified time, which is 5 x 100 minutes with the results of theoritical calculations and practicum data differing by a maximum of 25%, without damaging the practicum equipment.					
	The assessment was carried out to measure all learning achievements, namely attitude attainment (CO1), (CO2), (CO3), knowledge (CO4) and (CO5) and skills (CO6) and (CO7).					
Assessment:	1. Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if it shows significantly better or less good attitude compared to the attitude of students in general. The results of the attitude assessment are not a component of the student's final grade, but rather as one of the graduation requirements. Students will graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness of students following lectures.					
	knowle individu quizzes	edge, genei ual assignr	include the resu ral skills, and s ments, group a ts, and final sem	pecial skills obt ssignments, pre	ained from esentations,	
	No	со	Assessment Components	Assessment Technique	Weight	
	1	CO4- CO7	Practice Performance of each topic	Practice	60%	
			Midterm	Practice	20%	
			Final Exam	Practice	20%	
				Total	100%	

Forms of media:	Board, LCD Projector, Laptop/Computer			
Literature:	<ol> <li>Lembar kerja Praktikum Elektronika Jurusan Pendidikan Teknik Elektro</li> <li>Robert Boylestad &amp; Louis Nashelsky, (1992), Electronic Devices and Circuit Theory, Englewood Cliffs, New Jersey, Prrentice-Hall Inc.</li> </ol>			
Date of revision	30 August 2018			



#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Fundamentals of Electricity Work
Module level, if applicable:	Undergraduate
Code:	EKO6210
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	2 <sup>nd</sup>
Module coordinator:	Dr. Edy Supriyadi
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	200 minutes lectures and 240 minutes structured activities per week.
Teaching and Learning Method	Discussion, Demonstration, and Lecturing
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.
Credit points:	2

Prerequisites course(s):	-	
	After taki	ng this course the students have ability to:
	ELO1	Demonstrate piousness to God, practice the values, norms, and academic ethics.
	ELO3	Capable to perform professional works in his/her field of expertise both individual and team works.
Expected learning	ELO4	Master in basic sciences and principles of electric
outcomes:	ELO5	Master in work standards, work methods, work implementations, and testing in electric power or industrial automation expertise.
	ELO7	Capable to manage vocational education and training of electrical engineering expertise by utilizing information and communications technology.
	CO1	Devoted to God Almighty and able to show a regius attitude, honest and patient.
	CO2	Demonstrates a responsible and independent attitude towards the assigned work.
	CO3 CO3.1 CO3.2	Knowledge of law and the basic theory of electricity. Understand the types of tools and materials used in practice. Understand how to use use of electrical measuring
	CO3.4	devices. Understand how to use a multimeter. Understand how to use a oscilloscope/CRO. Understand the principle of charging and discharging capacitors and inductors.
Course outcomes:	CO3.6	Understand the characteristics of components R, L and C.
	CO3.7	Understanding the characteristics of R-L-C series and parallel circuits in an AC source.
	CO3.8	Understand the effect of frequency on the R-L-C circuit.
		Understanding the three-phase network source. Understanding the characteristics of the load at the three phase source.
	CO3.11	Understanding phase sequences on three phase systems.
	CO3.12	Understand the three-phase power measurement system.
	CO4	Apply the theory of measurement and measure electrical devices.
	CO4.1	Capable to choose the tools and materials used for practice.

	fr CO4.3 A CO4.4 A CO4.5 A CO4.5 A CO4.6 M F CO4.7 A CO4.7 A CO4.8 T CO4.8 T CO4.9 S S CO4.10 A t CO4.11 T	or practice Apply the u Apply the u Apply the capacitors a Measuring R-L-C load Apply mea barallel to A Test the eff Stringing cources. Arranging hree phase Test the ph	se of a mu se of a osc process of and inducto the amoun on a dc or surements AC sources ect of frequ and meas and meas	Itimeter co cilloscope/( of charging ors. t of curren ac power s to series uency on the suring the uring load nce in a the	rrectly. CRO correc g and dis t and powe source. R-L-C se ne R-L-C ci ee-phase character ree phase	ctly. charging er on the eries and ircuit. network ristics at system.
ELO and CO mapping:	CO1 CO2 CO3 CO4	ELO1	ELO3	ELO4	ELO5	ELO7
Courses Description:	The Basic Electric Practice will develop student competencies regarding basic electricity concepts and law, electrical circuit elements, methods and theorems of unidirectional source circuit analysis, phasor concepts and their application in a series of alternating one-phase sources, selecting measuring tools and analyzing measurement results electric quantity. Lectures are carried out with various approaches that are appropriate to the context of the material and the potential of students, including: contextual, cooperative, and problem based learning that leads to student center learning. Continuous assessment is carried out on a competency basis and harmonized with lecture activities.					

	achi	evements, r	nt was carried ou namely attitude atta 3) and skills (CO4).		•		
	1. Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if it shows significantly better or less good attitude compared to the attitude of students in general. The results of the attitude assessment are not a component of the student's final grade, but rather as one of the graduation requirements. Students will graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness of students following lectures.						
Assessment:	2. Final grades include the results of the assessment of knowledge, general skills, and special skills obtained from individual assignments, group assignments, presentations, quizzes, insert tests, and final semester examinations with the following guidelines						
	No	со	Assessment Object	Assessment Technique	Weight		
	1	CO2	Attitude (presence, activity, discipline, honesty)	Observation	10%		
	2	CO3-CO4	Practice Performance of each topic	Rubric assessment of the implementation of lectures and reports	40%		
			Midterm	Practice Exam	20%		
			Final Exam	Practice Exam	30%		
				Total	100%		
Forms of media:	Boai	rd, LCD Proj	jector, Laptop/Comp	outer			
Literature:	<ol> <li>Alexander Sadiku. 2007. Fundamentals of Electric Circuits New York: McGraw-Hill International Edition.</li> <li>Ridsdale. (1984) Elecetrical Circuits for Engineering. New York: McGrawHill.</li> <li>Sudjana Sapi'ie. Alat Ukur dan Pengukuran Listrik. Jakarta: Pradnya Paramita.</li> <li>Mohamad Ramdani. 2008. Rangkaian Listrik. Jakarta: Erlangga.</li> </ol>				ng. New		

	<ol> <li>Mussama, Imam Mustholiq. Pegangan Kuliah Dasar Listrik, Listrik DC dan AC. Yogyakarta: FT UNY (not published).</li> <li>Mussama, Imam Mustholiq. Pengukuran Listrik, Jilid 1 dan Jilid 2. Yogyakarta: FT UNY (not published).</li> <li>Budiono Mismail. 1995. Rangkaian Listrik, Jilid Pertama. Bandung: ITB</li> </ol>
Date of revision	13 July 2018



## Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Control System
Module level,if applicable:	Undergraduate
Code:	EKO6211
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	2 <sup>nd</sup>
Module coordinator:	Sigit Yatmono, M.T.
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Discussion and Lecturing
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.

Credit points:	2
Prerequisites course(s):	-
Expected learning outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics</li> <li>ELO3 Capable to perform professional works in his/her field of expertise both individual and team works</li> <li>ELO4 Master in basic sciences and principles of electric</li> <li>ELO7 Capable to manage vocational education and training of electrical engineering expertise by utilizing information and communications technology</li> </ul>
Course outcomes:	<ul> <li>CO1 Devoted to God Almighty and able to show a regius attitude, honest and patient.</li> <li>CO2 Menunjukkan sikap bertanggung jawab atas pekerjaan di bidang keahliannya dan memiliki motivasi mengembangkan diri.</li> <li>CO3 Mastering knowledge about the principles of Mathematics and Physics related to the principles of electricity.</li> <li>CO3.1 Understand the basic concepts of control systems which include the introduction of control system components, types of basic control actions (open and closed loop).</li> <li>CO3.2 Understand the concept of control system mathematical modeling of physical system characteristics.</li> <li>CO3.3 Understand the concept of testing the stability of a control system using the Hurwitz and Routh stability concept methods.</li> <li>CO3.5 Understand the concept of PID regulation in a control system.</li> </ul>

		Indus	strial Autom	ation.			
	CO4.1 Formulate and describe the functions of the c				of the contr	ol	
		system aided by MATLAB software.					
	CO4.2 Analyze system response tests from math model equations using MATLAB software.						al
	CO4.3 Analyze system stability tests from mathem equation models using MATLAB software.						al
	<ul> <li>CO4.4 Determine the PID control coefficient and application examples using the Matlab program and the microcontroller code.</li> <li>CO5 Analyze and solve technical problems related the electrical engineering by applying the principles of Mathematics.</li> <li>CO5.1 Apply mathematical principles in particular, linear equations, and numerical calculations in the problem of the mathematical model of the control system.</li> <li>CO5.2 Model the control system in the form of a bloch diagram.</li> <li>CO5.3 Analyze the control system response tests.</li> <li>CO5.4 Analyze the control system stability test.</li> </ul>					nd	d
						m	
		O5.5 Desi		ased contro	ol system, d		e
	Í						1
			ELO1	ELO3	ELO4	ELO7	
		CO1	$\checkmark$				
		CO2		✓			
ELO and CO mapping:		CO3			✓		
		CO4				<b>~</b>	
		CO5				<b>~</b>	
Courses Description:	sys cor mc its res ap	stems, proc ntrol with odeling of ph Laplace to sponse and	ess dynam a good nysical syste ransform a alysis 1,2 a amples and	ics and mo feedback ems with blo nd signal f and high; I basic cont	understand deling, sequ technique, ock diagram low graph, system stal rol actions (	uential contr mathemati approach w orde syste bility setting on / off, P,	rol, cal /ith em gs, PI,

	achie know 1. A obse assu The if it s the a asse but r grad Attitu follow 2. F know indiv quizz	evements, vledge (CC ttitude ass rvation te mption that student is hows sign attitude of essment ar ather as of uate from ude assess wing lectur inal grade vledge, ge idual assi	es include the results eneral skills, and speci ignments, group assig tests, and final semeste	hent (CO1) da d (CO5). at each meeti -assessment u ent has a good good attitude or bod attitude con he student's fin uirements. Student's fin student's fin uirements. Student's fin student's fin uirements. Student's fin student's fin uirements, prese	in (CO2), ing using using the attitude. not good npared to e attitude al grade, dents will attitude. students sment of ned from entations,
Assessment:	No	со	Assessment Object	Assessment Technique	Weight
	1	CO1- CO2	Active in class Assignment Discussion	Observation Rubric	15%
				Observation	
	2	CO3	Presentation Quiz Assignment Midterm	Observation Rubric Test Rubric Test	50%
			Presentation Quiz Assignment Midterm Final Exam Presentation	Rubric Test Rubric Test Test Rubric	50%
	2	CO3 CO4- CO5	Presentation Quiz Assignment Midterm Final Exam	Rubric Test Rubric Test Test	50%
		CO4-	Presentation Quiz Assignment Midterm Final Exam Presentation Model the control system Calculate control system response characteristics	Rubric Test Rubric Test Test Rubric Assignment	

Forms of media:	Board, LCD Projector, Laptop/Computer	
Literature:	<ol> <li>Ahmad Faozan Alfi, 2002, Dasar Sistem Kendali, Diktat Kuliah JPTE UNY.</li> <li>Heru Dibyo Laksono, 2014, Sistem Kendali dengan MATLAB, Graha Ilmu.</li> <li>Ogata, Katsuhiko, 1995, Teknik Kontrol Automatik, Erlangga.</li> <li>Nise, S Norman, 2011, Control system Engineering, John Wolley &amp; Sons</li> <li>Dorf, Richard C, 2008, Modern Control Systems, Pearson Education International.</li> </ol>	
Date of revision	13 July 2018	



## Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Computer Network Laboratory Work
Module level, if applicable:	Undergraduate
Code:	EKO6212
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	2 <sup>nd</sup>
Module coordinator:	Deny Budi Hertanto, M.Kom.
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	300 minutes lectures and 360 minutes structured activities per week.
Teaching and Learning Method	Discussion, Demonstration, and Lecturing
Workload:	Total workload is 272 hours per semester which consists of 300 minutes lectures, 360 minutes structured activities, and 360 minutes self-study per week for 16 weeks.

Credit points:	3						
Prerequisites course(s):	-						
		king this course the students have ability to: Demonstrate piousness to God, practice the values,					
		norms, and academic ethics					
Expected learning outcomes:		Capable to perform professional works in his/her field of expertise both individual and team works.					
	ELO4 I	Master in basic sciences and principles of electric					
		Capable to manage vocational education and training of electrical engineering expertise by utilizing information and communications technology					
	CO1	Devoted to God Almighty and able to show a regius attitude, honest and patient.					
	CO2	Demonstrates a responsible and independent attitude towards the assigned work.					
	CO3	Knowledge of law and the basic theory of electricity.					
	CO3.1 CO3.2	Understand the Basic Introduction to Computer Networks. Understand LAN Cabling.					
	CO3.3	Understand Internet Protocol Addressing.					
	CO3.4 CO3.5	Understand Subnetting. Understand Static Routing with the Packet Tracer Program.					
Course outcomes:	CO3.6	Understand Computer Network Design Using Switches and Routers					
	CO4	Identifying and solving current and future problems in Electric Power Engineering or Industrial Automation using the laws and basic theories of electricity within a broader application framework.					
	CO4.1	Resolve Basic Introduction to Computer Networks Problems.					
	CO4.2	Able to make UTP network cable to connect computers in the Local Area Network.					
	CO4.3	Resolve computer network addressing issues.					
	CO4.4 CO4.5	Resolve subnetting issues. Resolve Static Routing Problems with the Packet Tracer Simulation Program.					
	CO4.6	Complete the Design of Computer Networks with Configuring the Switch and Router.					

		ELO1	ELO3	ELO4	ELO7		
	CO1	✓					
ELO and CO mapping:	CO2		✓				
	CO3			✓			
	CO4				✓		
Courses Description:	Computer Networks are courses that are given so that students are able to explain the concept of computer networks and implement local computer networks based on the TCP / IP protocol. The material covered includes the basic concepts of networks, network topology, network layers and protocols, IP addressing and routing. Computer Network Subjects are courses that consist of Theory and Practice which in implementing learning are carried out together. Computer Networks are courses that are given so that students are able to explain the concept of computer networks and implement local computer networks based on the TCP / IP protocol. The material covered includes the basic concepts of networks, network topology, network layers and protocols, IP addressing and routing. Theory courses are held in odd semester, while Practice courses are conducted in even semester.						
Assessment:	The assessment was carried out to measure all learning achievements, namely attitude attainment (CO1) dan (CO2), knowledge (CO3) and skills (CO4). 1. Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if it shows significantly better or less good attitude compared to the attitude of students in general. The results of the attitude assessment are not a component of the student's final grade, but rather as one of the graduation requirements. Students wil graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness of students following lectures. 2. Final grades include the results of the assessment of knowledge, general skills, and special skills obtained from individual assignments, group assignments, presentations, quizzes, insert tests, and final semester examinations with the following guidelines						

	No	СО	Assessment Object	Assessment Technique	Weight	
	1	CO2	Attitude (presence, activity, discipline, honesty)	Observation	10%	
	2	CO3-	Online Exam	e-learning quiz	10%	
		CO4	Competence test 1	Written Test	10%	
			Competence test 2	Practice Test	15%	
			Competence test 3	Written Test	15%	
			Competence test 4	Simulation	20%	
			Competence test 5	Written, Simulation, and Interview Test	20%	
				Total	100%	
Forms of media:	Board, LCD Projector, Laptop/Computer					
Literature:	<ol> <li>Deny Budi Hertanto. 2014. Modul Jaringan Komputer. Bahan Pertkuliahan Teknik Elektro. Yogyakarta : FT UNY</li> <li>Cisco Study Lab, 2008, Student Lab Manual, CCNA Networking Academy</li> <li>Tanenbaum, Andrew, 2003, Jaringan Komputer, New York: Prenhallindo</li> <li>Stalling, William, 2007, Jaringan Komputer, Jakarta: Salemba Teknika</li> </ol>					
Date of revision	13 Ju	ıly 2018				



## Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Microprocessor System
Module level, if applicable:	Undergraduate
Code:	EKO6213
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	2 <sup>nd</sup>
Module coordinator:	Dr. Moh. Khairudin
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Discussion and Lecturing
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.

Credit points:	2					
Prerequisites course(s):	-	-				
	After tal	king this course the students have ability to:				
		emonstrate piousness to God, high loyalty to academic values, norms, and ethics.				
		Can carry out work in accordance with the professional field of expertise both individually and in teams.				
Expected learning outcomes:	ELO4 I	Master in basic sciences and principles of electric.				
oucomes.	i	ELO5 Master in work standards, work methods, work implementations, and testing in electric power or industrial automation expertise.				
	f	Able to manage vocational education and training in the field of Electrical Engineering by utilizing information and communication technology.				
	CO1	Devoted to God Almighty and able to show a religious attitude, honest and patient.				
	CO2	Demonstrates responsibility for work in their area of expertise independently.				
	CO3	Knowledge of law and the basic theory of electricity.				
	CO4	Knowledge of the preparation of scientific papers including work reports in accordance with scientific procedures based on data and information analysis.				
Course outcomes:	CO5	Knowledge of identifying, formulating and solving control systems in Electric Power Engineering or Industrial Automation.				
	CO6	Identifying and solving current and future problems in Electric Power Engineering or Industrial Automation using the laws and basic theories of electricity within a broader application framework.				
	C07	Apply automation techniques for the purposes of electrical and renewable energy (magnetic contactors, power electronics, PLCs, and microcontrollers).				

		ELO1	ELO3	ELO4	ELO5	ELO7
	CO1	✓				
	CO2		✓			
ELO and CO mapping:	CO3			✓		
LEO and OO mapping.	CO4				✓	
	CO5					<b>~</b>
	CO6					<b>~</b>
	C07					✓
Courses Description:	This course discusses the introduction of microprocessors or microcomputers, MPF-1 Z-80 Microprocessors, MPF-1 Microcontroller programming, Arithmetic and logic operations, MPF-1 functioning, parallel interface and interrupt techniques. Followed by discussing the microcontroller system which includes microcontroller system architecture, microcontroller minimum system, type of microcontroller, microcontroller programming, input and output ports, uploading programs to the microcontroller and microcontroller applications in electrical engineering systems					

	outco CO 2 CO 7 1. A co a a co a T C Q	omes, nan ; knowled	nely attainment lead dge CO 3 and CO ssessment is carri- on techniques and on that basically he student is given od if it shows sig ompared to the at s of the attitude ass udent's final grade n requirements. St	ed to measure a rning achievements 4; and skills CO 5, ed out at each mea or self-assessmer every student ha a value of a very go hificantly better or titude of students sessment are not a e, but rather as o udents will graduat I attitude. Attitude a	s CO 1 and CO 6, and eting using it using the s a good bod attitude less good in general. component one of the e from this
Assessment:	a le 2. F k ir li	ilso cons ectures. Final grac nowledge ndividual	siders the active des include the re e, general skills, ar assignments, gr Exams, and Final E  Assessment	ness of students esults of the assend special skills obt roup assignments xaminations with th Assessment	following essment of ained from , quizzes,
	1	CO1 and CO2	Object Attitude (presence, activity, discipline, honesty)	Technique           Observation	5%
	2	CO3, CO4,	a. Assignment 1-4	Written test	20%
		CO5, CO6, and CO7	b. Project Assignment	Project accuracy	15%
			c. Quiz	Written test	20%
			d. Midterm exam	Written test	20%
			e. Final exams	Written test	20%
				Total	100%

Forms of media:	Board, LCD Projector, Laptop/Computer
Literature:	<ol> <li>Gayenelly B. Grover &amp; Francois Penichorex. (1993).The Acknowledgement of Z80, Barkeley : SYBEX Inc.</li> <li>Andrianto, Heri. (2008). Pemrograman Mikrokontroler AVR ATMEGA 16 menggunakan Bahasa C (CodeVision AVR). Bandung: Informatika.</li> <li>Atmel. (2008). ATMega16. Diakses pada tanggal 22 Juli 2013, dari http://www.atmel.com/images/doc2466.pdf.</li> <li>Sigit Yatmono dkk, Z80 Simulator Media Belajar Simulasi, UNY Press, 2014.</li> </ol>
Date of revision	13 July 2018



## Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Electrical Machinery
Module level,if applicable:	Undergraduate
Code:	EKO6314
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	2 <sup>nd</sup>
Module coordinator:	Dr. Sukir, M.T.
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	150 minutes lectures and 180 minutes structured activities per week.
Teaching and Learning Method	Discussion and Lecturing
Workload:	Total workload is 136 hours per semester which consists of 150 minutes lectures, 180 minutes structured activities, and 180 minutes self-study per week for 16 weeks.

Credit points:	3				
Prerequisites course(s):	-				
	After taking this course the students have ability to:				
	ELO1	Demonstrate piousness to God, high loyalty to academic values, norms, and ethics			
Expected learning outcomes:	ELO3	Capable to perform professional works in his/her field of expertise both individual and team works			
Expected learning outcomes:	ELO4	Master in basic sciences and principles of electric			
	ELO7	Capable to manage vocational education and training of electrical engineering expertise by utilizing information and communications technology			
		Fear God Almighty and be able to show a religious attitude, honest and patient			
		Demonstrates responsibility for work in their area of expertise independently			
		Knowledge of the principles of Mathematics and Physics related to the principles of electricity.			
		Understanding the principles of Mathematics in particular trigonometry, differentials, and integrals in electrical machines.			
Course Outcomes:	CO3.2	Understanding the principles of Physics in particular rotating motion, torque, magnetic fields, Faraday's law, and Lorenz force in electric machines.			
	CO4 ł	Knowledge of law and the basic theory of electricity.			
	CO4.2 CO4.3 CO4.4 CO4.5 CO4.6	Understanding direct current generator. Understanding direct current motor. Understand 1 phase transformer. Understand 3 phase transformer. Understand the measuring transformer. Understanding the alternating current motor is not synchronous.			
	CO4.8	Understand the alternating current generator synchronously (alternator). Understand the alternating current motor synchronously.			

	0	elect			•	s related to principles of
	C	CO5.1 Apply mathematical principles, e trigonometry, differentials, and integrals in e machines.				
	<ul> <li>CO5.2 Solve technical problems of direct current motor</li> <li>CO5.3 Solve technical problems of phase I transformer</li> <li>CO5.4 Solve 3 phase transformer technical problems.</li> <li>CO5.5 Solve technical problems of measuring transform</li> <li>CO5.6 Solve technical problems of motor alternating cu</li> <li>not synchronously.</li> <li>CO5.7 Solve the technical problems of the motor alternation</li> </ul>					
	0				ty generatio field of gene	n in general ration.
		CO6.2 Appl		ry of altern	rrent genera ating currei	ator. ht generator
			ELO1	ELO3	ELO4	ELO7
		CO1	✓			
		CO2		✓		
ELO and CO mapping:		CO3			✓	
		CO4			✓	
		CO5				✓
		CO6				✓
Courses Description:	Electric Machine are courses that consist of Theory and Practice which in the implementation of learning are carried out separately. Theory courses are held in odd semester, while Practice courses are conducted in even semester. On this occasion only the description of the subject of Electric Machine Theory will be delivered, the Electric Machine Theory consists of 3 (three) sub materials, namely: (a). Direct Current Machine that strips about Generators and Motors. (b). Transformer that examines 1 (one) phase and 3 (three) phase power transformers, and special transformers. (c). Alternating Current					

	Machine that peels about a synchronous machine consisting of 3 phase and 1 phase induction motors. (b). Simultaneous (synchronous) engines which strip away alternators and synchronous motors. A summary of each sub-material includes: a set of equality, working principles, characteristics and simple analysis of each sub-material.						
	achievements namely: CLO achievements	nent is carried out s, namely attainme 1 (A.1.1) and CLO 2 s, namely: CLO 3 (K. ent of learning skills, 0).	nt learning acl (A.3.2)), knowled 1.1) and CLO 4	hievements, dge learning (K 1.2) and			
Assessment:	observation to assumption the The student is if it shows signattitude of a assessment components of the requirement this course if for CLO 2 (A.3 2. Final grad knowledge, a group assign	esessment is carried echniques and / or nat basically every s given a value of a very gnificantly better or students in general especially CLO 1 of the student's final ents for graduation, s they have a minimum 3.2) included in the final des include the res nd skills obtained fr ments, presentations r examinations with the	self-assessmen tudent has a go ery good attitude less good attitude (A.1.1) do n grade, but rathe students will gra n of good attitude nal assessment. sults of an ass om individual as s, quizzes, inser	at using the bod attitude. or not good de than the of attitude ot become er as one of aduate from e. However, essment of ssignments, t tests, and			
	No CO	Assessment Components	Assessment Technique	Percent			
	1 CO2	Attitude (presence, activity, discipline, honesty)	Observation	10%			
	2 CO3- CO4	Individual assignments	Individual task	15%			
		Group assignments	Group task	15%			
		Midterm exam	Written test	20%			
		Final exam	Written test	40%			
	L		Total	100%			
Forms of media:	Board, LCD Projector, Laptop/Computer						
Literature:	1 Sunyoto. 2014. Mesin Listrik Arus Searah. Bahan Pertkuliahan Teknik Elektro. Yogyakarta : FT UNY						

	<ol> <li>Sunyoto. Dkk. Mesin arus Searah. Modul Pembelajaran I. Yogyakarta : FT UNY</li> <li>Sunyoto. 2015. Transformator. Bahan Pertkuliahan Teknik Elektro. Yogyakarta : FT UNY</li> <li>Sunyoto, dkk. Transformator. Modul Pembelajaran II. Yogyakarta : FT UNY</li> <li>Sunyoto. 2015 Mesin Listrik Arus Bolak-Balikr. Bahan Pertkuliahan Teknik Elektro. Yogyakarta : FT UNY</li> <li>Austen Styigant (1981). The J&amp;P Transformer Book. London, Butterworths</li> <li>Jurek,ST (1976). Electrical Macine for techniciant and technician engineers. London : Longman</li> <li>Theraja.BL (1980). Tex Book of electrical tecnology. New Delhi : Nirja</li> <li>Wildi.T (1981). Electrical Power Technology. New York. John willy &amp; Son</li> </ol>
Date of revision	13 July 2018





# **UNIVERSITAS NEGERI YOGYAKARTA**

FACULTY OF ENGINEERING DEPARTMENT OF ELECTRICAL ENGINEERING EDUCATION Jalan Colombo Nomor 1 Yogyakarta 55281 Telephone (0274) 586168 ext 276,289,292, (0274) 586734, Fax (0274) 586734 Web:ft.uny.ac.id, E-mail: elektro@uny.ac.id

#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Civic Education			
Module level, if applicable:	Undergraduate			
Code:	MKU6207			
Sub-heading,if applicable:	-			
Classes,if applicable:	-			
Semester:	3 <sup>rd</sup>			
Module coordinator:	Dr. Eny Kusdarini, S.H., M.Hum.			
Lecturer(s):	Team			
Language:	Bahasa Indonesia			
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course			
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.			
Teaching and Learning Method	Discussion			
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.			
Credit points:	2			
Prerequisites course(s):	-			
Expected learning outcomes:	After taking this course the students have ability to: ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics ELO2 Demonstrate nationalism, responsibility, and tolerance to both society and environmet			

		apable to perform professional works in his/her field expertise both individual and team works
	CO1.	Devoted to God Almighty and able to show a religious attitude, honest and patient
	CO2.	Contribute to improving the quality of life in a society, nation, state, and advancement of civilization based on Pancasila
	CO2.1	Analyze the Nature and Objectives of Development of Citizenship Education in Higher Education
	CO3.	Acting as proud and loving citizens of the country, having nationalism and a sense of responsibility to the country and nation
	CO3.1	Analyzing the Urgency of National Identity
	CO3.2	Analyzing the Implementation of National Integration
Course Outcomes:	CO3.3	Analyzing the shape of the Indonesian Constitution and Regulations under the Constitution
	CO3.4	Analyzing the Harmony of the Obligations and Rights of States and Citizens
	CO4.	Respect the diversity of cultures, views, religions, and beliefs, as well as other people's original opinions or findings
	CO4.1	Analyzing Democracy sourced from Pancasila
	CO4.2	Analyzing Archipelago Insight
	CO5.	Obey the law and discipline in social and state life
	CO5.1	Analyzing the Concept of Fair Law Enforcement
	CO5.2	Analyzing the Concepts and Challenges of National Defense and National Defense
	CO6.	Demonstrates responsibility for work in their area of expertise independently
	CO6.1	Develop Citizenship Projects Regarding theContextual Issues of Citizenship Education in the context of AI Islam Kemuhammadiyahan

			ELO1	ELO2	ELO3	
		CO1	<ul> <li>✓</li> </ul>			
		CO2		✓		
ELO and CO mapping:		CO3		<b>√</b>		
	CO4			✓		
	CO5			✓		
		CO6			$\checkmark$	
Courses Description:	This course contains basic concepts of insight and enthusiasm nationality, patriotism, democracy, legal awareness, respect for diversity and participation to build a nation based on Pancasila. Corresponding with its function, Citizenship Education organizes education nationality, democracy, law, multiculturalism and citizenship for students in order to support the realization of citizens who are aware of their rights and obligations, and smart, skilled and character so that they can be relied on to build nation.					
	<ol> <li>Assessment is carried out to measure all learning achievements, namely attainment learning achievements (CO 1), (CO 2), (CO 3), (CO 4), (CO 5), and (CO 6).</li> <li>Final scores include the results of general knowledge assessment obtained from individual assignments, group assignments, project citizens, Midterm Exams, and Final Semester Exams with the following guidelines.</li> </ol>				4), (CO 5), nowledge ments, n Exams,	
Assessment:	No	СО	Assessment Object	Assessment Technique	Weight	
	1	CO1	Attitude (presence, activity, discipline, honesty)	Observation	15%	
	1	CO2,	Duty	Article	20%	
		CO3, CO4, CO5,	Project Citizen	Presentations and Papers	20%	
			Midterm exam	Written test	20%	

	CO6 Final exams Written test 25%					
	Total 100%					
Forms of media:	Board, LCD Projector, Laptop/Computer					
	<ul> <li>Main Literature:</li> <li>22. Sunarso, dkk. (2006). Pendidikan Kewarganegaraan. Yogyakarta: UNY Press.</li> <li>23. Tim Penyusun. (2016). Pendidikan Kewarganegaraan Untuk Perguruan Tinggi. Jakarta: Direktorat Jenderal Pembelajaran dan Kemahasiswaan Kementerian Riset Teknologi Pendidikan Tinggi.</li> <li>24. Taniredja, T. (2010). Pendidikan Kewarganegaraan di Perguruan Tinggi Muhammadiyah. Bandung: Alfabeta.</li> </ul>					
Literature:	<ol> <li>Supporting literature</li> <li>Branson, MS. (1998). The Role of Civic Education. Calabasas: Center of Civic Education (CCE) diakses di http://civiced.org</li> <li>Budimansyah, D dan Suryadi. K. (2008). PKn dan Masyarakat Multikultural. Bandung: SPS UPI Bandung</li> <li>Cogan, J dan Derricot, R. (1998). Citizenship for The 21st Century International Perspective on Education. London: Kogan Page.</li> <li>Hardiman, BF. 2011. Hak-Hak Asasi Manusia, Polemik dengan Agama dan Kebudayaan. Jakarta: Kanisius</li> <li>Kaelan. (2002). Filsafat Pancasila, Pandangan Hidup Bangsa Indonesia. Yogyakarta: Paradigma.</li> <li>Kranenburg. (1975). Ilmu Negara Umum. Jakarta: Pradnya Paramita.</li> <li>Mahfud MD, M. (2001). Dasar dan Struktur Ketatanegaraan Indonesia. Jakarta: PT Rineka Cipta.</li> <li>Mahfud MD, M. (2000). Demokrasi dan Konstitusi di Indonesia: Studi Tentang Interaksi Politik dan Kehidupan Ketatanegaraan. Jakarta: PT Rineka Cipta</li> <li>Miriam Budiardjo. (1986). Dasar-dasar Ilmu Politik, Jakarta: PT. Gramedia, cet. X</li> <li>Mohtar Mas'oed. (1999). Negara, Kapital dan Demokrasi, Yogyakarta: Pustaka Pelajar</li> <li>Pranowo, MB. (2010). Multidimensi Ketahanan Nasional. Jakarta: Pustaka Alvabet</li> <li>Riyanto, Astim, (2009). Teori Konstitusi. Bandung: Yapemdo.</li> </ol>					

	<ol> <li>Sanusi, A. (2006). Model Pendidikan Kewarganegaraan Menghadapi Perubahan dan Gejolak Sosial. Bandung: CICED.</li> </ol>
	14. Surbakti, Ramlan. (2010). Memahami Ilmu Politik. Jakarta. Grasindo.
	15. Suroyo, D. (2002). Integrasi Nasional dalam Perspektif Sejarah Indonesia. Pidato Pengukuhan Guru Besar Ilmu Sejarah pada Fakultas Sastra, Undip Semarang
	16. Tilaar, HAR. (2007). MengIndonesia Etnisitas dan Identitas Bangsa Indonesia. Jakarta: PT Rineka Cipta.
	<ol> <li>Torres, Carlos Alberto. (1998). Democracy, Education, and Multiculturalism: Dilemmas of Citizenship in a Global Word. Roman and Littlefield publisher.</li> </ol>
	<ol> <li>Undang-Undang Republik Indonesia Nomor 12 Tahun 2006 Tentang Kewarganegaraan</li> </ol>
	19. Undang-Undang Republik Indonesia Nomor 12 Tahun 2011 Tentang Tata Urutan aturan Perundang- Undangan di Indonesia
	20. Undang-Undang Republik Indonesia Nomor 24 Tahun 2009 Tentang Bendera, Bahasa, dan Lambang Negara, serta Lagu Kebangsaan.
	21. Undang-Undang Republik Indonesia Nomor 48 Tahun 2009 Tentang Kekuasaan Kehakiman.
	22. Undang-Undang Republik Indonesia Nomor 3 tahun 2002 tentang Pertahanan Negara.
	23. Wahab, A dan Sapriya. (2011). Teori dan landasan Pendidikan Kewarganegaraan. Bandung: Alfabeta.
	24. Winataputra, US. (2001). Jati Diri Pendidikan Kewarganegaraan Sebagai Wahana Sistematik Pendidikan Demokrasi. Bandung: Disertasi SPS UPI Bandung.
Date of revision	6 July 2018



# **UNIVERSITAS NEGERI YOGYAKARTA**

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#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Educational Psychology			
Module level, if applicable:	Undergraduate			
Code:	MDK6202			
Sub-heading,if applicable:	-			
Classes,if applicable:	-			
Semester:	3 <sup>rd</sup>			
Module coordinator:	Dr. Ketut Ima Ismara, M.Pd., M.Kes.,			
Lecturer(s):	Team			
Language:	Bahasa Indonesia			
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course			
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.			
Teaching and Learning Method	Discussion			
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.			
Credit points:	2			
Prerequisites course(s):	-			
Expected learning outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics.</li> <li>ELO2 Demonstrate nationalism, responsibility, and tolerance to both society and environmet</li> </ul>			

	<ul> <li>ELO5 Mastering work standards, work methods, wor implementation, and testing in the field of electri power engineering and industrial automation.</li> <li>ELO6 Capable to make plans, implement, and evaluat</li> </ul>				d of electric ation.	
	learning in electric power or industrial auton expertise					
	de	ing pious monstrate tience.		lmighty and ess, hone		
	life	ontributing to in the comm vancement o	nunity, the na	ation, the sta	ite, and the	
Course Outcomes:	inc pro da in to	CO3. Knowledge on developing scientific paper, including work report that is in line with scientific procedure based on the analysis, information, and data, and the ability to interpret and communicate in an accurate and accountable manner in order to solve problems and phenomena related to the occupation.				
	CO4. Apply education management at school and training institution in the field of electrical engineering					
	CO5 Manage the laboratory and workshop at training center and technology and vocational education according to the provisions of the work safety and health standards in the field of electrical engineering					
		ELO1	ELO2	ELO5	ELO6	
	CO1	✓				
	CO2		✓			
ELO and CO mapping:	CO3			✓		
	CO4				<ul> <li>✓</li> </ul>	
	CO5				✓	
Courses Description:	Educational Psychology Lectures will develop contextual thinking (according to the characteristics of the study program) and develop elements of learning media and learning methods as learning resources based on information technology and / or computers. The main studies include: designing self success, getting to know yourself, learning strategies and realizing self success. It also examines the application of computer-based learning media will discuss the design of mind concept maps (mind mapping) with mindjet software. Lectures are carried out using problem based learning and project based learning					

		sment nunicatio	involves active on of interactions b	particip	
Assessments:	<ol> <li>Assessment is carried out to measure all learning achievements, namely attainment learning achievements (CO 1), general skills (CO 2), knowledge (CO 3), and special skills (CO 4 and CO 5).</li> <li>Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if it shows significantly better or less good attitude compared to the attitude of students in general. The results of the attitude assessment are not a component of the student's final grade, but rather as one of the graduation requirements. Students will graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness of students following lectures.</li> <li>Final grades include the results of the assessment of knowledge, general skills, and special skills obtained from individual assignments, group assignments, presentations, quizzes, insert tests, and final semester examinations with the following guidelines.</li> </ol>				
	No	CO	Assessment Object	Assess ment Techni que	Weight
	1	CO2	Presentation	Observ	10%
	2	CO3,	a. Individual	ation e. Accur	10%
		CO4	assignments	acy of	
		and	b. tim	progr	10%
		CO5	assignments c. quiz	am result	20%
			d. Midterm exam	S	20%
			e. Final Exams	f. Writte	30%
				n	
				Total	100%
Forms of media:	Board	I, LCD F	Projector, Laptop/Com	nputer	
Literature:	<ol> <li>Elliott <i>et. al</i> . 2000. <i>Educational Psychology: Effective Teaching, Effective Learning</i>, 3/e. New York: Mc Graw Hill, inc.</li> <li>Howard E. Gardner. 2006. <i>Multiple Intelligences</i>: New Horizons in Theory and Practice.</li> </ol>				

	3. Howard L. Kingsley. 1948. <i>The nature and conditions of learning</i> . New York: Prentice-Hall, inc.
	<ol> <li>Sardiman A.M. 2004. Interaksi dan motivasi belajar mengajar. Indonesia: Raja grafindo Persada.</li> </ol>
	5. Sri Esti Wuryani Djiwandono. 2006. <i>Psikologi</i> <i>Pendidikan revisi II.</i> Jakarta: Grasindo.
	6. Thomas Amstrong. 2002. Sekolah Para Juara. ASCD.
Date of revision	6 July 2018



# **UNIVERSITAS NEGERI YOGYAKARTA**

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#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Control Systems Laboratory Work		
Module level, if applicable:	Undergraduate		
Code:	EKO 6215		
Sub-heading,if applicable:	-		
Classes,if applicable:	-		
Semester:	3 <sup>rd</sup>		
Module coordinator:	Ariadie Chandra Nugraha, M.T.		
	Dr. Istanto Wahyu Djatmiko, M.Pd.		
Lecturer(s):	Dr. Edy Supriyadi, M.Pd.		
	Rustam Asnawi, Ph.D		
Language:	Bahasa Indonesia		
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course		
Teaching format / class hours per week during the semester:	The form of learning is in the form of lectures, which consist of 100 minutes of face-to-face activities per week per semester; (2) structured assignment activities 120 minutes per week per semester; and (3) 120 minutes of independent activities per week per semester.		
Teaching and Learning Method	Discussion, Demonstration, and Lecturing		
Workload:	Total workload is 26 hours 40 minutes of face-to-face activities per semester		
Credit points:	2		
Prerequisites course(s):	-		
Expected learning outcomes:	After taking this course the students have ability to: ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics		

		Capable to perform professional works in his/her field f expertise both individual and team works				
	ELO4 N	laster in basic sciences and principles of electric				
	ir	Aaster in work standards, work methods, work nplementations, and testing in electric power or industrial automation expertise.				
	ELO6 Capable to make plans, implement, and evaluate learning in electric power or industrial automation expertise					
	CO1.	Being pious to God Almighty and able to demonstrate religiousness, honesty, and patience.				
	CO2.	Demonstrating responsibility on the respective profession of expertise in an independent manner.				
	CO3.	Knowledge on the principles of Mathematics and Physics in relation to the principles of electrical power				
	CO3.1	Students are able to explain a simple open loop control system with one sensor and one actuator.				
Course Outcomes	CO4.	Knowledge on developing scientific paper, including work report that is in line with scientific procedure based on the analysis, information, and data, and the ability to interpret and communicate in an accurate and accountable manner in order to solve problems and phenomena related to the occupation.				
	CO4.1	Students are able to explain the analysis of first order control system which is realized in the open loop control system to regulate motor speed.				
	CO4.2	Students are able to explain the closed loop control system to control motor speed and position (servomechanism) and analyze the transient response and steady state of the system.				
	CO4.3	Students are able to explain the characteristics of each parameter P (Proportional), I (Integral), and D (Derivative).				
	CO5.	Facilitate, assess, and implement the learning process and learning results in a professional manner, as well as building community partnership in the scope of vocational education in conducting duties of the teacher profession				
	CO5.1	Students are able to assemble a simple open loop control system with one sensor and one				

		actuat	or.				
	CO5.2 Students are able to arrange a first-order con- system which is realized in an open loop con- system to regulate motor speed.						
	CO5.3 Students are able to arrange a closed loop control system to control motor speed and position (servomechanism) and analyze the transient response and steady state conditions of the system.						
	CO5.4 Students are able to arrange the PID control system.						
		ELO1	ELO3	ELO4	ELO5	ELO6	
	CO1	✓					
ELO and CO mapping	CO2		✓				
	CO3			✓			
	CO4				✓		
	CO5					✓	
Courses Description:							

	outco 1 an skills 1.	omes, n d CO 2) s (CO 5) Attitude using ol using th a good good at or less g students conside lectures Final gr knowled individu present	assessment is carrie oservation technique le assumption that ba attitude. The student titude or not good if i good attitude compa- s in general. Attitude rs the activeness of	arning achievem and CO 4), and s ed out at each m is and / or self-as asically every str is given a value t shows significa red to the attitud assessment als students followin ults of the attituc sment obtained f up assignments, erm Examination	ents (ČO special neeting ssessment udent has of a very antly better e of so ng le, rom
	No	СО	Assessment Object	Assessment Technique	Weight
Assessments	1	CO1	Assessment of attitude, presence, discipline, activeness	Observation	10%
	2	CO2	Practice report, performance per practice, performance of Final Practice Exams	Observation	10%
	3	CO3, CO4,	a. Performance per practice	Observation Individual	15%
		and CO5	b. Quiz	Practice Test (adapts to	10%
			c. Practice Report	the technique	20%
			d. Final exams	used)	35%
		1	1	Total	100%
Forms of media:	Boar	d, LCD	Projector, Laptop/Co	mputer	
Literature:		<i>Labshee</i> Kendali.	et (lembar kerja p	raktikum) Prakt	tik Sistem

	12. Ahmad Faozan Alfi, 2002, <i>Dasar Sistem Kendali</i> , Diktat Kuliah JPTE UNY.
	13. Heru Dibyo Laksono, 2014, <i>Sistem Kendali dengan MATLAB</i> , Graha Ilmu.
	14. Ogata, Katsuhiko, 1995, <i>Teknik Kontrol Automatik</i> , Erlangga.
Date of revision	18 August 2018



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### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Microprocessor Systems Laboratory Work
Module level,if applicable:	Undergraduate
Code:	EKO 6216
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	3 <sup>rd</sup>
Module coordinator:	Muh. Khairudin, MT., Ph.D
Lecturer(s):	Rustam Asnawi, Ph.D Dr. Edy Supriyadi, M.Pd. Totok Heru TM., M.Pd
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	The form of learning is in the form of lectures, which consist of 100 minutes of face-to-face activities per week per semester; (2) structured assignment activities 120 minutes per week per semester; and (3) 120 minutes of independent activities per week per semester.
Teaching and Learning Method	Discussion, Demonstration, and Lecturing
Workload:	Total workload is 26 hours 40 minutes of face-to-face activities per semester
Credit points:	2
Prerequisites course(s):	-

	A 44 4 - 1 -	and the answer the actual states in the same shall be a
		ng this course the students have ability to:
		emonstrate piousness to God, high loyalty to academic lues, norms, and ethics
		apable to perform professional works in his/her field of spertise both individual and team works
Expected learning outcomes:	in	<i>Master</i> in work standards, work methods, work plementations, and testing in electric power or industrial utomation expertise.
		apable to make plans, implement, and evaluate learning in ectric power or industrial automation expertise
	ele	apable to manage vocational education and training of ectrical engineering expertise by utilizing information and mmunications technology
	CO1.	Being pious to God Almighty and able to demonstrate religiousness, honesty, and patience.
	CO2.	Demonstrating responsibility on the respective profession of expertise in an independent manner.
	CO3.	Knowledge on developing scientific paper, including work report that is in line with scientific procedure based on the analysis, information, and data, and the ability to interpret and communicate in an accurate and accountable manner in order to solve problems and phenomena related to the occupation.
Course Outcomes	CO3.1	Explain the history and concept of microprocessors, microprocessor systems, Z-80 microprocessors, microcontrollers and microcontroller systems.
	CO4.	Apply information and communication technology in conducting duties as instructor and educational staff
	CO4.1.	Students understand the components of the Z-80 Microprocessor system, memory maps and addressing mode (data transfer).
	CO4.2	Students understand the structure and programming instructions of the Z-80 microprocessor
	CO4.3	Students understand arithmetic and logic programming and the function of Register Flag
	CO4.4	Students understand jumping and looping programming
	CO4.5	Students understand Stack Pointer (Push and

		Pop) p	orogrami	ming				
	CO4.6	CO4.6 Students understand Arduino Microcontroller programming and C language microcontroller system						
	CO4.7	-						
	CO4.8	CO4.8 Students understand the concept of analog data acquisition in Arduino micro						
	CO4.9	9 Students understand the concept of instructions and timers						
	CO5.	Have full mastery of automation engineering for electrical power and renewable energy (magnetic contactor, electronic power PLC and microcontroller).						
	CO5.1	Stude microo			the a or control	pplicatior	n of a	
				EL OS	FLOG	EL 07		
	<u> </u>	ELO1	ELO3	ELO5	ELO 6	ELO7		
EL O and CO	CO1	ELO1		ELO5	ELO 6	ELO7		
ELO and CO mapping	CO2		ELO3		ELO 6	ELO7		
	CO2 CO3			ELO5	ELO 6	ELO7		
	CO2					ELO7		

Assessments	ach 1), (CC 2. Att obs ass The if it the ass but gra Att foll 3. Fin kno ind qui	nieveme genera O 4 and itude as servatio sumptio e stude shows attitude sessme t rather itude as owing le al grade owledge ividual a zzes, in	ents, namely attainn I skills (CO 2), know CO 5). sessment is carried n techniques and / n that basically event is given a value of significantly better of students in gen nt are not a comport as one of the gradu rom this course if a sessment also con ectures. es include the result of general skills, and assignments, group	measure all learning nent learning achieve vledge (CO 3), and s d out at each meeting or self-assessment us of a very good attitude or less good attitude or less good attitude neral. The results of the nent of the student's lation requirements. t least have a good a siders the activeness ts of the assessment d special skills obtain o assignments, prese I semester examinati	g using using the od attitude. e or not go compared he attitude final grade Students v attitude. s of studer t of hed from entations,	lls ood d to e, will nts		
A3633116113	No	СО	Assessment Object	Assessment Technique	Weight			
	1	CO2	Presentaton	Observation	10%			
	2	CO3, CO4, and CO5	a. Individual assignments b. Tim assignments	The effectiveness and efficiency of the program as well as the accuracy of the program results	10% 10% 10%			
			c. Practicum report	Written	20%			
			d. Midterm exam	Written test design program	20%			
			e. Final exam	Z-80 programming ability test (Program effectiveness and efficiency)	30%			
				Total	100%			
Forms of media:	Board	LCD P	roiector. Lanton/Co	mputer		•		
Literature:	<ul> <li>Board, LCD Projector, Laptop/Computer</li> <li>Alan G.Smith. Introduction to Arduino. 2011, <u>http://www.introtoarduino.com/downloads/IntroArduinoBook.pdf</u>, downloaded: Aug 2018</li> <li>Andrianto, Heri. (2008). Pemrograman Mikrokontroler AVR ATMEGA 16 menggunakan Bahasa C (CodeVision AVR). Bandung: Informatika.</li> </ul>							

	3. Gayenelly B. Grover & Francois Penichorex. (1993). The Acknowledgement of Z80, Barkeley : SYBEX Inc.
	<ol> <li>Sigit Yatmono dkk, Z80 Simulator Media Belajar Simulasi, UNY Press, 2014.</li> </ol>
	<ol> <li>Simon Monk, Programming Arduino Getting Started with Sketches, McGraw Hill Companies, 2012</li> </ol>
	<ol> <li>Sriharsa, B. S., Zabiullah., Vishnu, S. B., &amp; Sanju, V. (2016). Password protected locking system using arduino. BVICAM's</li> </ol>
	<ul> <li>Internasional Journal of Technology, 8(1), 959-964.</li> <li>7. Tony Olsson. Arduino Wearable Projects. Packt Publishing, Birmingham-Mumbai. 2015</li> </ul>
	8, Z-80 Microprosesor Handbook, Zilog
Date of revision	18 August 2019



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### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Electrical Circuit Laboratory Work				
Module level, if applicable:	Undergraduate				
Code:	EKO6217				
Sub-heading,if applicable:	-				
Classes,if applicable:	-				
Semester:	3 <sup>rd</sup>				
Module coordinator:	Faranita Surwi, S.T.,M.T.				
Lecturer(s):	Rustam Asnawi, ST.,MT.,PhD.				
Language:	Bahasa Indonesia				
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course				
Teaching format / class hours per week during the semester:	The form of learning is in the form of lectures, which consist of 150 minutes of face-to-face activities per week per semester; (2) structured assignment activities 180 minutes per week per semester; and (3) 180 minutes of independent activities per week per semester.				
Teaching and Learning Method	Discussion, Demonstration, and Lecturing				
Workload:	Total workload is 53 hours 20 minutes of face-to-face activities per semester.				
Credit points:	3				
Prerequisites course(s):	-				
Expected learning outcomes:	After taking this course the students have ability to: ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics ELO3 Capable to perform professional works in his/her field of expertise both individual and team works				

	FLO4 M	aster in basic sciences and principles of electric
	ELO5 Ma im inc	aster in work standards, work methods, work plementations, and testing in electric power or dustrial automation expertise.
	tra	apable to manage vocational education and ining of electrical engineering expertise by utilizing ormation and communications technology
	CO1.	Being pious to God Almighty and able to demonstrate religiousness, honesty, and patience.
	CO2.	Demonstrating responsibility on the respective profession of expertise in an independent manner.
	CO3.	Knowledge on the law and basic theories of electricity.
	CO3.1	Understand the types of tools and materials used in practice
	CO3.2	Understand the use of electrical measuring devices used in practice.
	CO3.3	Understanding the Effect of RLC Loads on DC and AC sources
	CO3.4	Understanding the Node Analysis Method
	CO3.5	Understanding the Mesh Analysis Method
Course Outcomes	CO3.6	Understanding Thevenin, Norton and Superposition Series Analysis Methods
	CO3.7	Understanding the Star-Triangle Connection System at the source.
	CO3.8	Understanding the 3 Phase Balanced and Unbalanced Power System
	CO3.9	Understanding the effect of frequency on series and parallel RLC loads
	CO3.10	Understanding the Parallel Series Resonance Method and Finding the Reactance Price
	CO3.11	Understanding impedance and admittance measurements
	CO3.12	Understand the transformation of star-triangles at weights
	CO4.	Identify and solve current and future problems of electrical power engineering or industrial automation using the laws and basic theories of electricity in the scope of wider applications.

	CO4.1		the ability s used for	<ul> <li>to choc</li> <li>practice</li> </ul>	ose the t	ools and
	CO4.2	•	the ability nt used fo	r to choo r practice	se the m	neasuring
	CO4.3	Understa and AC		Effect of	RLC Load	ds on DC
	CO4.4	Understa	anding the	Node Ana	alysis Met	hod
	CO4.5	Understa	anding the	Mesh Ana	alysis Met	hod
	CO4.6	Understa Superpo	0	Thevenin es Analys	•	
	CO4.7		anding the and the sour	e Star-Tr rce.	iangle Co	onnection
	CO4.8		anding th ced Powe	e 3 Pha r System	se Balan	ced and
	CO4.9		anding the Illel RLC k	effect of f bads	requency	on series
	CO4.10 Understanding the Parallel Series Resonand Method and Finding the Reactance Price CO4.11 Understanding impedance and admittand measurements					
	CO4.12	Understa at weigh		ansformati	on of star	-triangles
		ELO1	ELO3	ELO4	ELO5	ELO7
	CO1	<b>~</b>				
ELO and CO mapping	CO2		×			
	CO3			✓	✓	
	CO4				✓	✓
Courses Description:	develop co more on introduction RLC, the measurem DC and A charging frequency resonance tests, mea load pow demonstra	ompetenc ket e ra on of mat e introduc nents of b C electric and dis effect o e, star and asuremen er, and p ation, obs	e intact (af impilan p erials and ction and oth DC an ity , series charging n RL C d triangle t of 3 pha ower qua ervation, j	fective, kr ractice) a power to use of d AC, vari s, parallel inductors series ar connectio se balanc lity. Lectu practice, b	nowl know issociated ools, load various ious types and mixe s and mixe s and o nd paralle ins,phase ced and u ures carrie poth indivi	ic Circuits ledge, and with the electricity electrical of circuits d circuits, capacitors, el loads, sequence nbalanced ed out by iduals and authentic

	participation , tidiness, cooperation, and work safety) knowledge and skills that are reflected in ( group practice assignments, individual pre-practice reports , and competency tests (practice) as a whole individual al ).							
Assessments	a a k 2. A u g g o s a g r a c S. F f f p	chievem chievem nowledge tititude as sing obs sing the ood attitute ood attitute r less go tudents i ssessme rade, but equirement t least ha onsiders inal scor nowledge rom indiversentation	ut to measure all le ment learning and CO 2 (A.3.2)), d skills (CO 4 (S.2 ed out at each mee s and / or self-asse asically every stude given a value of a t shows significantly red to the attitude of ults of the attitude onent of the studen graduate from this of . Attitude assessment students following lease students following lease students following lease students following lease students following lease students following lease students following lease and special skills obt group assignment t tests, and final se ing guidelines.	.7) ). ting ssment ent has a very y better f t's final course if ent also ectures. ent of ained s,				
	No	СО	Assessment Technique	Weight				
	1	CO2	Attitude (presence, activity, discipline, honesty)	Observation	10%			
	2	CO3 and CO4	Implementation of lectures and practice reports	Rubric assessment of the implementation of lectures and reports	40%			
			Midterm exam	Practice Exam	20%			
			Final exams					
			i indi exams	Questions	30%			
				Total	30% 100%			
Forms of media:	Boar	d, LCD F	Projector, Laptop/C	Total				
Forms of media: Literature:	Boar 1. 2.	Kerchne <i>Circuit.</i> VIII, IX. Mussan	Projector, Laptop/C er & Corcoran. ( New York: John W na, Imam Musthol <i>Listrik DC.</i> Yog	Total	100% Current er VI, VII, ah Dasar			

	4. Ridsdale. (1984) <i>Elecetrical Circuits for Engineering.</i> New York: McGrawHill. Part Two. Chapter 7.
	<ol> <li>Wildi, Theodore. (2002). <i>Electrical Machines, Drives,</i> and Power Systems. Ohio: Prentice Hall. Part IV. Chapter 30.</li> </ol>
	<ol> <li>6</li></ol>
	<ol> <li>, (2012). Power Systems Protection, Power Quality, and Substation Automation. IDC Technologies &amp; bookboon.com</li> </ol>
Date of revision	18 August 2018



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### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Electric Machinery Laboratory Work					
Module level, if applicable:	Undergraduate					
Code:	EKO6218					
Sub-heading,if applicable:	-					
Classes,if applicable:	-					
Semester:	3 <sup>rd</sup>					
Module coordinator:	Drs. Sukir, M.T.					
Lecturer(s):	Team					
Language:	Bahasa Indonesia					
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course					
Teaching format / class hours per week during the semester:	300 minutes lectures and 360 minutes structured activities per week.					
Teaching and Learning Method	Lecture, Discussion, Practicum, Question and Answer					
Workload:	Total workload is 272 hours per semester which consists of 300 minutes lectures, 360 minutes structured activities, and 360 minutes self-study per week for 16 weeks.					
Credit points:	3					
Prerequisites course(s):	-					
Expected Learning Courses:	After taking this course the students have ability to:ELO1 Demonstrate piousness to God, high loyalty t academic values, norms, and ethicsELO3 Capable to perform professional works in his/her fiel of expertise both individual and team worksELO4 Master in basic sciences and principles of electric					

	<ul> <li>ELO5 Master in work standards, work methods, work implementations, and testing in electric power or industrial automation expertise.</li> <li>ELO7 Capable to manage vocational education and training in the field of Electrical Engineering by utilizing information and communication technology.</li> <li>ELO9 Capable to develop a vocational education innovation and publich exist.</li> </ul>					
	and publish scientific paper.					
	CO1.	Being pious to God Almighty and able to demonstrate religiousness, honesty, and patience.				
	CO2.	Demonstrating responsibility on the respective profession of expertise in an independent manner.				
	CO3.	Knowledge on the law and basic theories of electricity.				
	CO3.1	Understanding direct current generator.				
	CO3.2	Understanding direct current motor.				
	CO3.3	Understand 1 phase transformer.				
	CO3.4	Understanding 3 phase transformer.				
	CO3.5	Understanding the alternating current motor is not synchronous.				
	CO3.6	Understand the alternating current generator synchronously (alternator).				
Course Outcomes	CO3.7	Understand the alternating current motor synchronously.				
	CO4.	Knowledge on developing scientific paper, including work report that is in line with scientific procedure based on the analysis, information, and data, and the ability to interpret and communicate in an accurate and accountable manner in order to solve problems and phenomena related to the occupation.				
	CO5.	Analyze and solve regular technical problems in relation to electrical power engineering by applying the principles of mathematics, physics, and chemistry				
	CO5.1	Solve technical problems of direct current motors.				
	CO5.2	Solve technical problems of phase I transformers.				
	CO5.3	Solve 3 phase transformer technical problems.				

· · · · · · · · · · · · · · · · · · ·									
	CO5.4		technica not synd	•		notor alte	ernating		
	CO5.5	Solve t current		problem	s of the r	notor alte	ernating		
	CO6.		Have full understanding on the general theory of electrical power plant and energy efficiency.						
	CO6.1	Apply t	Apply the theory of direct current generator.						
	CO6.2		Apply the theory of alternating current generat synchronously (alternator).						
	CO7.	wiring		n, the la		e line d electricit			
	CO7.1	Arrang	ing elect	ric meas	uring dev	vices.			
	CO7.2	Readin	ig electri	c measu	ring devi	ces.			
	CO8.	for safe	Apply electrical power engineering safety system for safety of the equipment as well as user health and safety.						
	CO8.1	Apply trials.	Apply Safety, security and health in practical trials.						
	CO9.	scientif informa commu manne	Develop scientific paper report that meet scientific procedure based on an information and data, as well as interpre- communicate in an accurate and accour manner to solve problems and issues rela- the occupation						
	CO9.1		e a pra shed rule		oort in a	iccordan	ce with		
		ELO1	ELO3	ELO4	ELO5	ELO7	ELO9		
	CO1	$\checkmark$							
	CO2		✓						
	CO3			✓					
ELO and CO mapping	CO4				✓				
	CO5					✓			
	CO6					✓			
	C07					✓			
	CO8					✓			
	CO9						✓		

Courses Description:	This course gives experience about attitudes related to devotion to God, the practice of values, norms, and academic ethics, and can carry out work in accordance with professional fields of expertise both individually and in teams. In addition, this course also provides knowledge experience about mastering basic science and basic electricity, and skills related to being able to manage vocational education and training in the field of Electrical Engineering by utilizing information and communication technology. The study material discussed in this course includes: the application of the principles of Mathematics and Physics in electric machines, direct current generators, direct current motors, 1 phase transformers, 3 phase transformers, measuring transformers, non-synchronous alternating current motors, alternating current generator (alternator), and synchronous motor. The study of each material includes: a set of equality, working principles, characteristics, technical analysis, and application of each material.					
Assessments:	<ul> <li>material.</li> <li>The assessment was conducted to measure all learning outcomes, namely attainment learning achievements (C and CO 2), knowledge (CO 3 and CO 4), special skills (C 5, CO 6, CO 7, and CO 8), and general skills (CO 9).</li> <li>1. Attitude assessment is carried out at each meeting using observation techniques and / or self-assessm using the assumption that basically every student h a good attitude. The student is given a value of a very good attitude or not good if it shows significantly be or less good attitude compared to the attitude of students in general. Attitude assessment also considers the activeness of students following lectures.</li> <li>2. Final scores include the results of the assessment of attitudes, knowledge, and skills obtained from observations of practice implementation, individual assignments in the form of practice reports, midterr individual practice exams, and end-semester individual practice exams, with the following</li> </ul>					
	No	СО	Assessment Object	Assessment Technique	Weight	
	1	CO1 and CO2	Assessment of religious attitudes, presence, discipline, and activeness	Observation	10%	
	2	CO3, and	Individual assignments in	Assignment	20%	

		3	CO4 CO5, CO6,	the form of practice reports. The process of implementing	Observation	20%
			CO7, CO8, and CO9	practice. Individual Mid Semester practice exams	Practice Test.	25%
				End of semester individual practice exams.	Practice Test.	25%
					Total	100%
Forms of media:	В	oard	, LCD P	rojector, Laptop/C	omputer	
Literature:	<ol> <li>Board, LCD Projector, Laptop/Computer</li> <li>Sunyoto. 2017. <i>Diktat Mesin Listrik</i>. Yogyakarta: Fakultas Teknik Universitas Negeri Yogyakarta.</li> <li>Theraja, B.L., &amp; Theraja, A.K. 2017. <i>A Textbook of Electrical Technology in S.I. Units Volume 1: Basic Electrical Engineering</i>. New Delhi: S. Chand.</li> <li>Theraja, B.L., &amp; Theraja, A.K. 2017. <i>A Textbook of Electrical Technology in S.I. Units Volume 2: AC &amp; DC Machines</i>. New Delhi: S. Chand.</li> <li>Styigant, A. 2012. <i>The J&amp;P Transformer Book</i>. London: Butterworths.</li> <li>Jurek, S.T. 2010. <i>Electrical Macine for Techniciant and Technician Engineers</i>. London : Longman.</li> </ol>					nta. pook of : Basic pook of : AC & DC ok. London:
Date of revision	3	1 Au	gust 20 <sup>-</sup>	18	-	



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### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Power Electronics				
Module level, if applicable:	Undergraduate				
Code:	EKO6219				
Sub-heading,if applicable:	-				
Classes,if applicable:	-				
Semester:	3 <sup>rd</sup>				
Module coordinator:	Dr. Istanto Wahyu Djatmiko, M.Pd.				
Lecturer(s):	Muhammad Ali, M.T. Drs. Sunomo, M.T.				
Language:	Bahasa Indonesia				
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course				
Teaching format / class hours per week during the semester:	The form of learning is in the form of lectures, which consist of 100 minutes of face-to-face activities per week per semester; (2) structured assignment activities 120 minutes per week per semester; and (3) 120 minutes of independent activities per week per semester.				
Teaching and Learning Method	Discussion, Demonstration, and Lecturing				
Workload:	Total workload is 26 hours 40 minutes of face-to-face activities per semester				
Credit points:	2				
Prerequisites course(s):	-				
Expected learning outcomes:	After taking this course the students have ability to: ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics				

		Capable to				rks in his/her field m works	
	ELO5 Master in work standards, work methods, work implementations, and testing in electric power or industrial automation expertise.						
	ELO6 Capable to make plans, implement, and evaluate learning in electric power or industrial automation expertise						
	CO1.	Being demons patience	trate	o God religious		and able to honesty, and	
	CO2.	,	ving the repreneu		independ	dence, struggle,	
Course Outcomes	CO3.					lathematics and les of electrical	
	CO4.	Knowle electrici		the law	and ba	isic theories of	
	CO5.		instituti			at school and d of electrical	
	CO6.	center a accordin	and tech ng to the standare	nology a provisioi	nd vocations of the	shop at training tional education work safety and d of electrical	
		ELO1	ELO3	ELO5	ELO6		
	CO1						
	CO2		✓				
ELO and CO mapping	CO3			✓			
	CO4			✓			
	CO5				✓		
	CO6				<b>~</b>		
Courses Description:	energy equipme power e convers regulato (inverter	<b>CO6</b> This course discusses the conversion of electronic-based energy for the purposes of controlling large power electric equipment. This course material covers: the concept of power electronics, power electronics components, AC / DC conversion circuits (rectifier & converter), AC / AC (ac regulator & cycloconverter), DC / DC (chopper), DC / AC (inverter), applications PSpice in power electronics, and industrial drives and applications. Lectures are carried out					

	using the student center learning approach with problem based learning strategies. Competency-based assessment involves active participation in lectures, quizzes, midterm insertions, and final semester exams.						
Assessments	<ol> <li>Assessment is carried out to measure all learning achievements, namely attainment learning achievements (CO 1 &amp; 2), knowledge (CO 3 &amp; 4), and special skills (CO 5 &amp; 6).</li> <li>Attitude assessment is carried out through direct observation of each student at each lecture meeting, including: attendance, discipline, personal and interpersonal interaction. This attitude assessment categories, namely: "Very Good", "Good", and "Less Good". The minimum attitude value is included in the "Good" category. By using observation and / or self- assessment techniques using the assumption that basically every student has a good attitude. The results of this attitude assessment are used as a consideration for determining the final assessment of this course.</li> <li>The final grade includes the results of the knowledge assessment, and the specific skills obtained from individual assignments, group assignments, presentations, quizzes, insert tests, and final semester examinations are determined as follows.</li> </ol>						
	No CO Assessment Assessment We Object Technique						
	No	СО			Weight		
	<b>No</b>	CO1 and CO2			Weight5%		
		CO1 and CO2 CO3, CO4,	Object Attendance & discipline Individual assignments	TechniqueObservationa. Accuracy of	5% 10%		
	1	CO1 and CO2 CO3, CO4, CO5, and	Object Attendance & discipline Individual assignments Tim assignments	TechniqueObservationa. Accuracy of program results	5% 10% 5%		
	1	CO1 and CO2 CO3, CO4, CO5,	Object Attendance & discipline Individual assignments Tim assignments Quiz	TechniqueObservationa. Accuracy of program	5% 10% 5% 15%		
	1	CO1 and CO2 CO3, CO4, CO5, and	Object Attendance & discipline Individual assignments Tim assignments Quiz Midterm exam	TechniqueObservationa. Accuracy of program results	5% 10% 5% 15% 20%		
	1	CO1 and CO2 CO3, CO4, CO5, and	Object Attendance & discipline Individual assignments Tim assignments Quiz Midterm exam Insert Exam 2	TechniqueObservationa. Accuracy of program results	5% 10% 5% 15% 20% 20%		
	1	CO1 and CO2 CO3, CO4, CO5, and	Object Attendance & discipline Individual assignments Tim assignments Quiz Midterm exam	TechniqueObservationa. Accuracy of program resultsb. written	5% 10% 5% 15% 20% 20% 25%		
	1	CO1 and CO2 CO3, CO4, CO5, and	Object Attendance & discipline Individual assignments Tim assignments Quiz Midterm exam Insert Exam 2	TechniqueObservationa. Accuracy of program results	5% 10% 5% 15% 20% 20%		
Forms of media:	1 2 Board	CO1 and CO2 CO3, CO4, CO5, and CO6	Object Attendance & discipline Individual assignments Tim assignments Quiz Midterm exam Insert Exam 2 Final exam	TechniqueObservationa. Accuracy of program resultsb. written	5%         10%         5%         15%         20%         20%         25%         100%		
Forms of media:	1 2 Board	CO1 and CO2 CO3, CO4, CO5, and CO6	Object Attendance & discipline Individual assignments Tim assignments Quiz Midterm exam Insert Exam 2 Final exam	TechniqueObservationa. Accuracy of program resultsb. written	5%         10%         5%         15%         20%         20%         25%         100%		
Forms of media: Literature:	1 2 Board 1. Dj	CO1 and CO2 CO3, CO4, CO5, and CO6	Object Attendance & discipline Individual assignments Tim assignments Quiz Midterm exam Insert Exam 2 Final exam	Technique         Observation         a. Accuracy of program results         b. written         Total         Computer tronika Daya dan	5% 10% 5% 15% 20% 20% 20% 25% 100%		

	2.	Hart, DW. (2011). Power Electronics. New York: The
		McGraw-Hill Companies, Inc.
	3.	Hughes, A. (2006). Electric Motors and Drives, 3rd
		Edition. Burlington: Newnes
	4.	Polka, D. (2003). Motor & Drives: A Practical
		Technology Guide. North Carolina: The
		Instrumentation, Systems, and Automation Society.
	5.	Rashid, MH. (2011). Power Electronics Handbook:
		Devices, circuits, and applications, Third Edition.
		Oxford: Elsevier, Inc.
	6.	Singh, MD & Khanchandani, KB. (2007)). Power
		Electronics, Second Edition. New Delhi: Tata McGraw-
		Hill Publishing Company Limited.
Date of revision	18	August 2018



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### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Commercial Electricity Installation					
Module level, if applicable:	Undergraduate					
Code:	EKO6220					
Sub-heading,if applicable:	-					
Classes,if applicable:	-					
Semester:	3 <sup>rd</sup>					
Module coordinator:	Dr. Djoko Laras Budiyo Taruno.					
Lecturer(s):	1. Dr. Dra. Zamtinah, M.Pd. 2. Ir. Alex Sandria Jaya Wardhana, M.Eng					
Language:	Bahasa Indonesia					
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course					
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.					
Teaching and Learning Method	Discussion, Demonstration, and Lecturing					
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.					
Credit points:	2					
Prerequisites course(s):	-					
Expected learning outcomes:	After taking this course the students have ability to: ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics					

		Demonstrate nationalism, responsibility, and					
		plerance to both society and environmet					
		Aaster in basic sciences and principles of electric Aaster in work standards, work methods, work					
	ir	nplementations, and testing in electric power or industrial automation expertise.					
	ELO6 Capable to make plans, implement, and evaluate learning in electric power or industrial automatic expertise						
	CO1.	Being pious to God Almighty and able to demonstrate religiousness, honesty, and patience.					
	CO2.	Demonstrating responsibility on the respective profession of expertise in an independent manner.					
	CO3.	Knowledge on the principles of Mathematics and Physics in relation to the principles of electrical power					
	CO3.1	Mastering the concept of need identification and analysis in an electrical installation system					
	CO3.2	Understand the principles of electricity and its relation to the operation and analysis of the electric power system.					
	CO4.	Knowledge on the law and basic theories of electricity.					
Course Outcomes	CO4.1	Understanding the components of the electric power system.					
	CO4.2	Understanding the modeling of electric power systems with a Single Line Diagram.					
	CO4.3	Understanding the types of interference in the electric power system					
	CO4.4	Understanding load flow in electric power systems					
	CO4.5	Understand short circuit interference in electric power systems					
	CO4.6	Understand the improvement of power factors and voltage profiles in the electric power system					
	CO4.7	Understand losses in the electric power system					
	CO4.8	Understand prinsip of power system optimization principles					
	CO5.	Apply education management at school and training institution in the field of electrical engineering					

	CO5.1 Apply mathematical principles especially diagrams, vectors, linear equations, and numerical calculations in power system problems.								
	CO5.2 Model an electric power system in the form of a single line diagram								
	CO5.3 Analyzing interference in the electric power system.								
	CO5.4	Analyzing	load flow	on an ele	ctric powe	r system.			
	CO5.5	Analyze voltage pr	•		power fac power sys				
	CO5.6	Designing electric po			coordinati	on in the			
		51.04	51.00		FLOS	51.00			
	C01	ELO1	ELO2	ELO4	ELO5	ELO6			
	CO1	V	<b>√</b>						
ELO and CO mapping	CO3		•	✓					
	CO4			•	1				
	CO5					✓			
Courses Description:	This course contains basic concepts of commercial electricity installations. Coverage of materials in this course covers materials and equipment for commercial electrical installations, protection systems, installation and applicable installation requirements, wiring diagrams and one line for commercial electrical installations, lighting and power installations in commercial buildings, designation of users and users and panels, systems earth and lightning rods in Indonesia and the commissioning test.								
Assessments	<ol> <li>Assessment is carried out to measure all learning achievements, namely attainment learning achievements (CO 1 &amp; 2), knowledge (CO 3 &amp; 4), and special skills (CO 5).</li> <li>Attitude assessment is carried out through direct observation of each student at each lecture meeting, including: attendance, discipline, personal and interpersonal interaction. This attitude assessment categories, namely: "Very Good", "Good", and "Less Good". The minimum attitude value is included in the "Good" category. By using observation and / or self- assessment techniques using the assumption that basically every student has a good attitude. The results of this attitude assessment are used as a consideration for determining the final assessment of this course.</li> </ol>								

	3. The final grade includes the results of the knowledge assessment, and the specific skills obtained from individual assignments, group assignments, presentations, quizzes, insert tests, and final semester examinations are determined as follows.						
	No	СО	Assessment Object	Assessment Technique	Weight		
	1	CO1,	Attendance	Documentation	10%		
	CO3, CO4,		Assignment	Presentation / written test	40%		
		and CO5	Midterm Exam	Presentation / written test	20%		
			Final Exam	Presentation / written test	30%		
				Total	100%		
Forms of media:	Boar	d, LCD P	rojector, Laptop/Con	nputer			
	1. Scheneider Electric Indonesia. (2002). Panduan Aplikasi Teknis. PT. Scheneider Indonesia.						
	Ζ.		Sugandi, dkk. Pand Yayasan Usaha Po				
Literature:	3. John Wiley & Sons. (2000). Electrical Installation Handbook. Publicis MCD Verlag: Munich.						
	4.		L. Smith & Steph I Wiring Industrial 7 <sup>t</sup>				
	5.		Mullin & Robert L. ommercial 7 <sup>th</sup> Editio		Electrical		
Date of revision	18 A	ugust 201	8				



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### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Commercial Electricity Installation Lab. Work
Module level, if applicable:	Undergraduate
Code:	EKO6221
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	3 <sup>rd</sup>
Module coordinator:	Dr. Djoko Laras Budiyo Taruno.
Lecturer(s):	<ol> <li>Ir. Alex Sandria Jaya Wardhana, M.Eng</li> <li>Ahmad Raditya Cahya Baswara, S.T., M.Eng.</li> </ol>
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	200 minutes lectures and 240 minutes structured activities per week.
Teaching and Learning Method	Lecture, Discussion, Practicum, Question and Answer
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-
Expected learning outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics.</li> <li>ELO3 Capable to perform professional works in his/her field of expertise both individual and team works</li> </ul>

	ir ir	laster in work standards, work methods, work nplementations, and testing in electric power or industrial automation expertise.
	ir	apable to manage vocational education and training the field of Electrical Engineering by utilizing nformation and communication technology
	CO1.	Being pious to God Almighty and able to demonstrate religiousness, honesty, and patience.
	CO2.	Demonstrating responsibility on the respective profession of expertise in an independent manner.
	CO3.	Knowledge on developing scientific paper, including work report that is in line with scientific procedure based on the analysis, information, and data, and the ability to interpret and communicate in an accurate and accountable manner in order to solve problems and phenomena related to the occupation.
	CO3.1	Understand the characteristics and working principles of the components used in industrial electrical installations
	CO3.2	Mastering the concept of using measurement instruments used in commercial electrical installations
Course Outcomes	CO4	Have full mastery and apply maintenance and repairmen methods for electrical power or industrial automation system.
	CO4.1	Arranging the motor control system 1 phase direct online system on the control panel box
	CO4.2	Arranging the control system reverses the direction of rotation of the motor 1 phase on the panel box (fwd-rev) manually and automatically
	CO4.3	Makes and applies a variety of lighting installation systems to commercial electrical installations
	CO5	Have full mastery of automation engineering for electrical power and renewable energy (magnetic contactor, electronic power PLC and microcontroller);
	CO5.1	Measuring light intensity and analyzing the measurement results
	CO5.2	Conduct measurements of ground resistance and conduct an analysis of the measurement results

				1	1			
			ELO1	ELO3	ELO5	ELO7		
		CO1	✓				_	
ELO and CO mapping:		CO2		✓			_	
		CO3			✓			
		CO4				✓		
		CO5				✓		
Courses Description:	This course practices the application of industrial electrical installations ranging from safety systems to system automation in electrical installations in industry. The scope of material in this course covers the identification of electrical components commonly used in industry, motor control of 3 phases both manually and automatically, improvement of power factor using bank capacitors either by manual or automatic settings, automatic main failure as main network backup (PLN) when automatic and relay based shutdown, 20 kv medium voltage protection system and industrial installation based on programmable logic control (PLC).							
Assessments:							nent has a y etter inal se if also ures. of ed ster ght	
	1		Presentat Individual		Dbservatio Accuracy o			
		CO3, CO4, and	assignme	nts p	orogram esults		70	

		CO5	Tim assignments	Accuracy of program results	10%
			Quiz	written	20%
			Midterm exam	written	20%
			Final exam	written	30%
				Total	100%
Forms of media:	Board	, LCD F	Projector, Laptop/C	omputer	
Literature:	K 2. Ir 3. J 3. F 4. R 5. R 9 6. S	Comersia C. Imam Rumah. akarta. ohn W landboc Ray C. Viring C Conald P Publishe Scheneid	Sugandi, dkk. Par Yayasan Usaha iley & Sons. (20 ok. Publicis MCD V Mullin & Robert I ommercial 7th Edit ?. O'Riley. (1988). E	nduan Instalasi Li Penunjang Tena 000). Electrical erlag: Munich. Smith. (2002) ion. Delmar. Electrical Groundi onesia. (2002).	strik Untuk aga Listrik: Installation . Electrical ng. Delmar
Date of revision	09 Ju	y 2019			



FACULTY OF ENGINEERING DEPARTMENT OF ELECTRICAL ENGINEERING EDUCATION Jalan Colombo Nomor 1 Yogyakarta 55281 Telephone (0274) 586168 ext 276,289,292, (0274) 586734, Fax (0274) 586734 Web:ft.uny.ac.id, E-mail: elektro@uny.ac.id

### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Occupational Health And Safety
Module level, if applicable:	Undergraduate
Code:	KTF6207
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	3 <sup>rd</sup>
Module coordinator:	Dr. Ketut Ima Ismara, M.Pd, M.Kes
Lecturer(s):	1. Dr. phil Nurhening Yuniarti, S.Pd.,M.T.
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Lecture, Discussion, Question and Answer
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-
Expected learning outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics</li> <li>ELO3 Capable to perform professional works in his/her field of expertise both individual and team works</li> </ul>

	<ul> <li>ELO5 Master in work standards, work methods, work implementations, and testing in electric power or industrial automation expertise.</li> <li>ELO6 Capable to make plans, implement, and evaluate learning in electric power or industrial automation</li> </ul>							
	expertise. CO1. Being pious to God Almighty and able to demonstrate religiousness, honesty, and patience.							
	CO2.	Contributir life in the the adva Pancasila.	community ncement	y, the nation	on, the sta	ate, and		
Course Outcomes	CO3.	CO3. Knowledge on developing scientific paper, including work report that is in line with scientific procedure based on the analysis, information, and data, and the ability to interpret and communicate in an accurate and accountable manner in order to solve problems and phenomena related to the occupation.						
	CO4.	CO4. Apply education management at school and training institution in the field of electrical engineering						
	CO5.	5. Manage the laboratory and workshop at training center and technology and vocational education according to the provisions of the work safety and health standards in the field of electrical engineering						
		ELO1	ELO3	ELO5	ELO6			
	CO1	·						
	CO2		~					
ELO and CO mapping:	CO3			~				
	CO4				✓			
	CO5				✓			
Courses Description:	This course discusses OHS Management based on the theories that are already available, analyzing the risk of work accidents by existing methods, and then making materials for analyzing examples of work accidents in the electric and heavy equipment fields to achieve safe conditions (safety workplace).							

Assessments:	<ol> <li>Assessment is carried out to measure all learning achievements, namely attainment learning achievement (CO 1), general skills (CO 2), knowledge (CO 3), and special skills (CO 4 and CO 5).</li> <li>Attitude assessment is carried out at each meeting us observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if it shows significantly better or le good attitude compared to the attitude of students in general. The results of the attitude assessment are not component of the student's final grade, but rather as co of the graduation requirements. Students will graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness of students following lectures.</li> <li>Final grades include the results of the assessment of knowledge, general skills, and special skills obtained from individual assignments, group assignments, presentations, quizzes, insert tests, and final semester examinations with the following guidelines.</li> </ol>						
	No	СО	Assessment Object	Assessment Technique	Weight		
	1	CO2	Presentation	Observation	10%		
	2	CO2	Individual	Written	10%		
		CO4,	assignments	Whiteh	1070		
		and	Tim	Liveliness of the			
		CO5	CO5	assignments	discussion	10%	
			Searching	Papers	20%		
			Assignments		2070		
			Midterm exam	Danara	<b> </b>		
				Papers	20%		
					2070		
			Final exam	Papers	30%		
				Total	100%		
Forms of media:	Boar	d, LCD	Projector, Laptop/0	Computer			
Literature:	<ol> <li>International Labour Organization (ILO). 2014. Safety and Health at Work: A Vision for Sustainable Prevention. Jerman: ILO.</li> <li>Ismara Ima, Eko Prianto, 2016. Keselamatan dan Kesehatan Kerja di Bidang Kelistrikan_Electrical Safety. solo: ADIMEKA.</li> </ol>						

	3. Ismara Ima, Eko Priyanto. 2017. Bagaimanakah Agar
	Laboratorium dan Bengkel Pendidikan Vokasi menjadi NYAMAN,
	SELAMAT dan SEHAT?. Yogyakarta:Unypress.
	4. Ismara Ima, dkk. 2018. Prinsip-Prinsip Keselamatan dan
	Kesehatan Kerja dalam LKS SMK. Yogyakarta: Kemendikbud.
	5. John Ridley. (2008). Ikhtisar Kesehatan dan Keselamatan
	Kerja Edisi Ketiga. Jakarta: Erlangga.
	6. Tim K3 FT UNY. 2014. Buku Ajar Keselamatan dan
	Kesehatan Kerja FT UNY. Yogyakarta: UNY Press.
Date of revision	09 July 2018



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### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Educational Socio-Antropology						
Module level, if applicable:	Undergraduate						
Code:	MDK6204						
Sub-heading,if applicable:	-						
Classes,if applicable:	-						
Semester:	3 <sup>rd</sup>						
Module coordinator:	Dr. Ariefa Efianingrung, M.Si						
Lecturer(s):	1. Dr. Ariefa Efianingrung, M.Si 2. Datu Jatmiko, M.A						
Language:	Bahasa Indonesia						
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course						
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.						
Teaching and Learning Method	Discussion, Inquiry and Lecturing.						
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.						
Credit points:	2						
Prerequisites course(s):	-						
Expected learning outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics</li> <li>ELO2 Demonstrate nationalism, responsibility, and tolerance to both society and environmet</li> </ul>						

	ELO8 Capable to apply research methods and preparation of scientific works						
Course Outcome:	CO1.		onstrate relig	God Almighty giousness, ho			
	life in		the community	improvement of y, the nation, the ilization based o	state, and the		
	CO2.1		ribe the releva ty and culture.	ance between e	education and		
	CO3.		• •	nd having the so n the people and	•		
	CO3.1			ital and cultura ess and failure o			
	CO4	CO4 Knowledge of pedagogical and didactic concepts in planning technological and vocational education learning devices in the field of Electrical Engineering.					
	CO4.1 Describe education that is suitable for multicultural Indonesian society						
			ELO1	ELO2	ELO8		
	CO	1	✓				
ELO and CO mapping:	CO	2		✓			
	CO	3		✓			
	CO	4			✓		
Courses Description:	This course discusses education as a socio-cultural process. This course provides basic knowledge about the importance of climate, approaches, and socio-cultural influences, both from school and from outside the school (family, peer groups, nation-society, and mass media) in multicultural (pluralistic) societies.) and education that is most suitable for humans (anthropos) in realizing Indonesia's national education goals now and in the future.						

Assessments	<ol> <li>The assessment is carried out to measure all learning achievements, namely attainment learning achievements (CO 1), (CO 2), and (CO 3) General knowledge (CO 4).</li> <li>Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if it shows significantly better or less good attitude compared to the attitude of students in general. The results of the attitude assessment are not a component of the student's final grade, but rather as one of the graduation requirements. Students will graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness of students following lectures.</li> <li>Final grades include the results of general knowledge assessments obtained from individual assignments, group assignments, presentations, quizzes, Insert Exams, and Final Examinations with the following guidelines.</li> </ol>						
		No	СО	Assessment Object	Assessment Technique	Weight	
		1	CO2, CO3	Attitude (presence, activity, discipline, honesty)	Observation	10%	
		2	CO3, CO4,	Individual assignments	Article	15%	
			CO5,	Tim assignments	Presentation and paper	15%	
				Midterm exam	Written test	20%	
	1			Final exam	Written test	40%	
					Total	100%	
Forms of media:	B	oard	, LCD P	rojector, Laptop/Co	omputer		
Literature:	<ol> <li>Board, LCD Projector, Laptop/Computer</li> <li>Septiarti, SW., dkk. 2017. Sosiologi dan Antropologi Pendidikan. Yogyakarta: UNY. Press.</li> <li>Ballantine, Jeanne H. 1985. Schools and Society: A Reader in Education and Sociology. London:Mayfield Publishing Company.</li> <li>Deal, Terrence E. &amp; Peterson, Kent D. 2011. Shaping School Culture: Pitfals, Paradoxes, &amp; Promises. San Fransisco: Jossey-Bass.</li> <li>Farida Hanum. 2011. Sosiologi Pendidikan. Yogyakarta: Kanwa Publisher.</li> <li>Harrison, L. E. &amp; Huntington, S. P. (ed). 2000. Culture Matters, How Values Shape Human Progress.New York : Basic Books.</li> <li>Imran Manan. 1989. Anthropologi Pendidikan, Suatu</li> </ol>						

	<ul> <li>Pengantar (Terj. George F. Kneller). Jakarta P2LPTK Dirjen Dikti.</li> <li>7. Sunyoto Usman. 2015. Sosiologi: Sejarah, Teori, dan Metodologi. Yogyakarta: Pustaka Pelajar.</li> <li>8 2018. Modal Sosial. Yogyakarta: Pustaka Pelajar.</li> <li>9. Suyata, dkk. 2000. Modul Sosio-Antropologi Pendidikan. Semi-Que.</li> <li>10. Tilaar, H.A.R. 1999. Pendidikan, Kebudayaan, dan Masyarakat Madani Indonesia. Bandung : Remaja Rosdakarya.</li> <li>11 2004. Multikulturalisme : Tantangan- tantangan Global Masa Depan dalam Transformasi Pendidikan. Jakarta : Grasindo.</li> <li>12 2012. Perubahan Sosial dan Pendidikan: Pengantar Pedagogik Transformatif untuk Indonesia. Jakarta: Rineka Cipta.</li> <li>13. Young Pai.1990. Cultural Fondations of Education. Columbus : Merrill Publishing Company.</li> </ul>
Date of revision	10 August 2018





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### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Technology and Vocational Education					
Module level, if applicable:	Undergraduate					
Code:	KTF6208					
Sub-heading,if applicable:	-					
Classes,if applicable:	-					
Semester:	4 <sup>th</sup>					
Module coordinator:	Dr. Istanto Wahyu Djatmiko, M.Pd.					
Lecturer(s):	Team					
Language:	Bahasa Indonesia					
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course					
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities peweek.					
Teaching and Learning Method	Discussion, Quiz, Inquiry and Lecturing.					
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.					
Credit points:	2					
Prerequisites course(s):	-					
Expected learning outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics</li> <li>ELO2 Demonstrate nationalism, responsibility, and tolerance to both society and environmet</li> <li>ELO3 Can be handled according to the expertise of each team</li> </ul>					

	<ul> <li>ELO5 Master in work standards, work methods, w implementations, and testing in electric power industrial automation expertise.</li> <li>ELO6 Capable to make plans, implement, and evalu learning in electric power or industrial automa expertise</li> </ul>						power or evaluate
	CO1	Sho		e, disciplir	ned, and h	onest attit	ude during
Courses Outcomes:	CO2						
	CO3	Mas	stering the	e concepts	•	ology and	vocational
	CO4	Able edu	e to apply	the conce	ept of PV i	n the orga	nization of electrical
	CO5						
	CO6 Able to analyze VE policy issues to improve the quality of TVE.						
			ELO1	ELO2	ELO3	ELO5	ELO6
	CO1		~				
	CO2	2		$\checkmark$	✓		
ELO and CO mapping:	CO3	3				✓	
	CO4	ŀ				✓	
	CO5	5					✓
	CO6	5					✓
	This course provides students with insight, knowledge, and learning experiences about the nature of technology and vocational / vocational education (VE) which includes: (1) VE foundation, (2) VE development, (3) VE role, (4) VE implementation model, (5) policies in VE, and (6) contemporary issues of VE. Lectures are carried out in the form of lectures and class and group discussions by assigning critical observations and analyzes to the practices of implementing vocational education in Indonesia						

Assessments:	2. / 2. / 0 1 1 1 0 0 0 1 1 2 1 2 1 2 1 2 1 2 1 2	o measure al at learning ach 4), and special ed out throu t each lecture pline, perso s attitude as od", "Good", a value is incluc servation and the assump od attitude. The ed as a consid this course esults of the l c skills obtai group ass ests, and final follows.	ievements skills (CO gh direct e meeting, nal and ssessment and "Less ded in the / or self- bion that e results of eration for knowledge ned from signments,			
	No	СО	Assessment Object	Assessment Technique	Weight	
	1	CO1 – CO6	Attendace	Presentation / written test	10%	
			Individual Assignment/Group Assignment	written test	20%	
			Mid	written test	30%	
			Final Exam	written test	40%	
				Total	100%	
Forms of media:	Board	d, LCD P	rojector, Laptop/Compu	ter		
Literature:	<ul> <li>Board, LCD Projector, Laptop/Computer</li> <li>25. Depdiknas. 1997. Ketrampilan menjelang 2020 Untuk Era Global. Jakarta: Depdiknas.</li> <li>26. Soeharsono Sagir. 1989. Membangun Manusia Karya. Jakarta: Pustaka Sinar Harapan.</li> <li>27. Thompson, J.F. 1973. Foundation of Vocational Education: Social and Philosophical Concept. New Jersey: Prentice Hall.</li> <li>28. Wardiman Djojonegoro. 1990. Mengembangkan manusia melalui pendidikan kejuruan. Jakarta.</li> <li>29. Fink, C.R. &amp; Crunkilton, J.R. 1999. Curriculum Development in Vocational and Technical Education: Planning, Content, and Implementation. Boston: Allyn And Bacon.</li> </ul>					

	30. Maclean, R & Wilson, D. 2010. International Handbook of Educatio fot The Changing World of Work. Bridging Academic and Vocating Learning. UNESCO-UNEVOC International Center for Technical anf Vocational Education Training. Bonn: Springer.
	<ol> <li>Dedi, Supriadi. 2002. Sejarah Pendidikan Teknik dan Kejuruan Indonesia: Membangun manusia Produktif. Jakarta: Direktorat Pendidikan Menengah Kejuruan, Direktorat Jendral Pendidikan Dasar dan Menengah, Departemen Pendidikan Nasional.</li> </ol>
Date of revision:	10 August 2019



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#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Power Electronics Laboratory Work
Module level, if applicable:	Undergraduate
Code:	EKO6222
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	4 <sup>th</sup>
Module coordinator:	Dr. Istanto Wahyu Djatmiko
	1. Drs. Sunomo, MT.
Lecturer(s):	2. Muhamad Ali, ST.,M.T.
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	200 minutes lectures and 240 minutes structured activities per week.
Teaching and Learning Method	Discussion, Demonstration, and Lecturing
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-
Expected learning outcomes:	After taking this course the students have ability to:

	r							
		Demonstrate piousness to God, high loyalty to academic values, norms, and ethics						
		Demonstrate nationalism, responsibility, and tolerance to both society and environmet						
		laster in bas	-		ciples of el	ectric		
	fi e A d	ELO7 Able to manage education and vocational training in the field of Electrical Engineering by utilizing information and communication technology, able to practice power electronic circuits according to their characteristics Able to make practice reports based on practice result data, Being able to be disciplined, teamwork thin critically and make the right decisions						
		Devoted to discipline and			d able to	practice		
		CO2 Students are proactive, responsible, and have motivation to develop themselves,						
Course Outcomes:		CO3 Students are able to practice power according to their characteristics,				er electronic circuits		
		Students are able to make practice reports based on practical results data,						
		Have the a thinking and				k, critical		
		ELO1	ELO2	ELO4	ELO7			
	CO1	✓						
	CO2		✓					
ELO and CO mapping:	CO3			✓				
	CO4			✓	~			
	CO5				✓	]		
Courses Description:	This course practices electronic energy-based energy conversion for the purpose of controlling large power electric equipment. Practice materials include the introduction of power electronics practice units, power electronic components, AC / DC, DC / DC conversion circuits, AC / AC, DC / AC, and drive circuits and their applications. Lectures are conducted using a learning approach at the student center with a project-based learning strategy. Competency-based assessment involves active participation in practicum, preparation, data collection, reporting of practicum results, and individual examinations.							

Assessments	2. / i i i c c c c c t t c c c c c c c c c c	achievem knowledg Attitude a observation ncluding: nterperso categorie Good". The Good". The Good" categorie cassessme his attitude determini The final assessme ndividual presentat	e, and special skills. ssessment is carried o on of each student at e attendance, discipline onal interaction. This at s, namely: "Very Good ne minimum attitude va ategory. By using obse ent techniques using th every student has a go de assessment are use ng the final assessmen grade includes the resu ent, and the specific sk assignments, group as	y attainment learning achievements, ial skills. s carried out through direct tudent at each lecture meeting, , discipline, personal and ion. This attitude assessment Very Good", "Good", and "Less attitude value is included in the using observation and / or self- es using the assumption that in thas a good attitude. The results of ent are used as a consideration for assessment of this course. les the results of the knowledge specific skills obtained from ts, group assignments, s, insert tests, and final semester			
	No	со	Assessment Object	Assessment Technique	Weight		
	1	CO1- CO5	Assignment	Practicum	10%		
			Practicum report	Written report	25%		
			Final Project Performance	Performance	30%		
			Final Project Report	Written report	30%		
			Attendance		5%		
				Total	100%		
Forms of media:	Boar	d, LCD F	Projector, Laptop/Comp	outer			
Literature:	<ol> <li>Tim Praktik Elektronika Daya. (2015). Labsheet Praktik Elektronika Daya. Yogyakarta: Jurusan Pendidikan Teknik Elektro FT UNY</li> <li>Tim Praktik Elektronika Daya. (2015). Buku Laporan Praktik Elektronika Daya. Yogyakarta: Jurusan Pendidikan Teknik Elektro FT UNY.</li> </ol>						
Date of revision	18 A	ugust 20	19				



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#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Undergraduate						
EKO6223						
-						
-						
4 <sup>th</sup>						
Dr. Djoko Laras Budyo Taruno, M.Pd.						
Ir. Alex Sandria Jaya Wardhana, M.Eng.						
Bahasa Indonesia						
Compulsory/ <del>Elective</del> Course						
100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week.						
Presentation, Discussion, Question and Answer, Problem Based Learning, Problem Solving.						
Total workload is 90 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.						
2						
-						
<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics</li> <li>ELO3 Can carry out work in accordance with the professional field of expertise both individually and in teams</li> <li>ELO4 Mastering basic science and basic electricity</li> </ul>						

	ELO7 Able to manage vocational education and training in the field of Electrical Engineering by utilizing information and communication technology.						
Course outcomes:		hanks to Go character,	od and able to show a religious attitude and				
	CO2 Demonstrates responsibility for work in their expertise independently.						
	CO3 Students are in planning the electrical field in buildings, hotels, industry.						
	CO3.1 Master the Concept of Requirement and Analysis electrical installation system						
	CO4 Knowledge of selecting and determining materia the purposes of design and implementation installations related to Electric Power Engineer Industrial Automation.						
	CO4.1 Understand the drawings, buttons, standards practical theoretical basis for electrical insta planning						
		Able to designed and electric		al systems	in the field	of lighting	
		Able to desig Fire Alarm,				tronic field	
		Knowledge systems in t and user sat	he contex		•	ing safety ent, health	
		Inderstand examination		l standards	s and cond	luct of test	
ELO and CO mapping		ELO1	ELO3	ELO4	ELO7		
	CO1	<ul> <li>✓</li> </ul>					
	CO2		<b>&gt;</b>				
	CO3			✓			
	CO4				✓		
	CO5				<ul> <li>✓</li> </ul>		
Courses Description:	Basic planning, electrical system & installation planning, lighting, power, electrical panels, lightning protection, air conditioning / air conditioning, telecommunications, sound & MATV, CCTV & building security alarms, fire alarms, technical requirements, technical analysis, job analysis, cost analysis and budget plan, Inspections and tests.						

Assessments:	<ol> <li>Assessment is carried out to measure all learning achievements, namely attainment learning achievements, knowledge, and special skills.</li> <li>Attitude assessment is carried out through direct observation of each student at each lecture meeting, including: attendance, discipline, personal and interpersonal interaction. This attitude assessment categories, namely: "Very Good", "Good", and "Less Good". The minimum attitude value is included in the "Good" category. By using observation and / or self-assessment techniques using the assumption that basically every student has a good attitude. The results of this attitude assessment are used as a consideration for determining the final assessment of this course.</li> <li>The final grade includes the results of the knowledge assessment, and the specific skills obtained from individual assignments, group assignments, presentations, quizzes, insert tests, and final semester examinations are determined as follows.</li> </ol>						
	1	CO1 –	Attitude	Documentation	10%		
		CO5	Individual Assignment/Group Assignment	Accuracy of program results/ Written	20%		
			Quiz	Accuracy of program results/ Written	10%		
			Mid	Written test	20%		
			Final Exam	Written test	20%		
		<u>.</u>		Total	100%		
Forms of media:	Boar	d, LCD P	rojector, Laptop/Comp	outer			
Literature:	<ol> <li>Gunter G Seip, (2000). Electrical Installations Handbook</li> <li>WE Steward &amp; J Watkins, Modern Wiring Practice</li> <li>Muhaimin, (2001). Teknologi Pencahayaan.</li> <li>WIliam &amp; Richard, (1997) Mechanical and Eelctrikal systems in Building.</li> <li>PUIL 2000</li> <li>Supreme, GAE, MG, Telemecanique Cataloges</li> <li>Philips, TOA, National, Nitan, Ademco cataloges</li> <li>Prasimax, (2002) Protocol TCP</li> </ol>						
Date of revision:	08 A	ugust 201	9				



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### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Electricity Installation Design Laboratory Work				
Module level, if applicable:	Undergraduate				
Code:	EKO6224				
Sub-heading,if applicable:	-				
Classes,if applicable:	-				
Semester:	4 <sup>th</sup>				
Module coordinator:	Dr. Djoko Laras Budyo Taruno, M.Pd.				
Lecturer(s):	Ir. Alex Sandria Jaya Wardhana, M.Eng.				
Language:	Bahasa Indonesia				
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course				
Teaching format / class hours per week during the semester:	200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week.				
Teaching and Learning Method	Discussion, Observation, Project Based Learning, Presentation.				
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.				
Credit points:	2				
Prerequisites course(s):	-				
Expected Learning Outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics</li> <li>ELO3 Can carry out work in accordance with the professional field of expertise both individually and in teams</li> </ul>				

	<ul> <li>ELO5 Mastering work standards, work methods, work implementation, and testing in the field of electric power engineering and industrial automation.</li> <li>ELO6 Managing laboratories and workshops in training centers, and technology and vocational education in accordance with the provisions of occupational safety and health in the field of Electrical Engineering</li> </ul>								
Course Outcomes:	<ul> <li>CO1 Demonstrate polite, honest, good faith in lectures.</li> <li>CO2 Contribute to improving the quality of life in a society, nation, state, and advancement of civilization based on Pancasila</li> <li>CO4 Apply education management to schools, education and training institutions in the field of Electrical Engineering.</li> <li>CO5 Managing laboratories and workshops in training centers, and technology and vocational education in accordance with the provisions of occupational safety and health in the field of Electrical Engineering</li> </ul>								
ELO and CO mapping:	CO1 CO2 CO4 CO5	ELO1	ELO3	ELO5	ELO6				
Courses Description:	Basic planning, electrical system & installation planning, lighting, power, electrical panels, lightning protection, air conditioning / air conditioning, telecommunications, sound & MATV, CCTV & building security alarms, fire alarms, technical requirements, technical analysis, job analysis, cost analysis								
Assessments:	<ul> <li>and budget plan, Inspections and tests.</li> <li>1. Assessment is carried out to measure all learning achievements, namely attainment learning achievements, knowledge, and special skills.</li> <li>2. Attitude assessment is carried out through direct observation of each student at each lecture meeting, including: attendance, discipline, personal and interpersonal interaction. This attitude assessment categories, namely: "Very Good", "Good", and "Less Good". The minimum attitude value is included in the "Good" category. By using observation and / or self-assessment techniques using the assumption that basically every student has a good attitude. The results of this attitude assessment are used as a consideration for determining the final assessment of this course.</li> </ul>								

	3. The final grade includes the results of the knowledg assessment, and the specific skills obtained from individua assignments, group assignments, presentations, quizzes insert tests, and final semester examinations are determined as follows.							
	No	со	Assessment Object	Assessment Technique	Weight			
	1	CO1 –	Attitude	Documentation	10%			
		CO5	Individual Assignment/Group Assignment	Observation report	20%			
			Quiz	Accuracy of program results/ Written	20%			
			Mid	Practicum test	20%			
			Final Exam	Practicum test	30%			
				Total	100%			
Forms of media:	Boar	d, LCD Pr	ojector, Laptop/Compu	iter				
Literature:	<ol> <li>Gunter G Seip, (2016). Electrical Installations Handbook</li> <li>WE Steward &amp; J Watkins, 2008). Modern Wiring Practice</li> </ol>							
	3	. Muhain	nin, (2011). Teknologi I	Pencahayaan.				
	4		& Richard, (2018) Med s in Building.	chanical and Ee	ctrikal			
	5	. PUIL 2	011 (2015)					
	<ol> <li>V: Supreme, ABB, Schneider, MG, Philips, TOA, National, Nitan, Ademco, Prasimax, (2012) Protocol TCP/IP.</li> </ol>							
Date of revision	15 Aı	ugust 201	9					



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### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Statistics
Module level, if applicable:	Undergraduate
Code:	MKU6210
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	4 <sup>th</sup>
Module coordinator:	Prof. Dr. Samsul Hadi, M.T.
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Discussion and Lecturing
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-
Expected learning outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics.</li> <li>ELO2 Demonstrate nationalism, responsibility, and tolerance to both society and environmet.</li> </ul>

	i	ELO5 Master in work standards, work methods, work implementations, and testing in electric power or industrial automation expertise.						
	e	ELO7 Capable to manage vocational education and training of electrical engineering expertise by utilizing information and communications technology.						
		Capable to apply research and scientific writing methods.						
	CO1	Devoted to God Almighty and able to show a regius attitude and character that is implemented in learning and learning outcomes.						
	CO2	Students actively participate, take responsibility, discipline, be able to work together, and have the motivation to develop themselves.						
	CO3	Describe the basic concepts of parametric and nonparametric statistics.						
	CO4	Compare descriptive and inferential statistics.						
Course outcomes:	CO5	Make a frequency distribution.						
	CO6	Make various types of graphs.						
	C07	Using the binomial distribution, khai-squared, normal, t, and Fisher for hypothesis testing.						
	CO8	Analyzing data with correlation techniques, regression analysis, and ANAVA statistics.						
	CO9	Using the SPSS program package to analyze data						
	CO10	Interpreting the results of data analysis.						
	CO11	Choosing the right statistical technique for a research problem.						

		ELO1	ELO2	ELO5	ELO7	ELO8	
	CO1	<ul> <li>✓</li> </ul>					
	CO2		~				
	CO3					✓	
	CO4					✓	
ELO and CO mapping:	CO5			✓	✓	✓	
	CO6			✓	✓	✓	
	C07				✓	✓	
	CO8				✓	✓	
	CO9				✓	✓	
	CO10				✓	✓	
	CO11				✓	✓	
Courses Description:							
Assessment:	<ul> <li>discussion includes basic concepts, applications, interpretation of data analysis results using the SPSS program package.</li> <li>1. Assessment is carried out to measure all learning achievements, namely attainment learning achievements, namely attainment learning achievements, knowledge, and special skills.</li> <li>2. Attitude assessment is carried out through direct observation of each student at each lecture meeting, including: attendance, discipline, personal and interpersonal interaction. This attitude assessment categories, namely: "Very Good", "Good", and "Less Good". The minimum attitude value is included in the "Good" category. By using observation and / or self-assessment techniques using the assumption that basically every student has a good attitude. The results of this attitude assessment are used as a consideration for determining the final assessment of this course.</li> <li>3. The final grade includes the results of the knowledge assessment, and the specific skills obtained from individual assignments, group assignments, presentations, quizzes, insert tests, and final semester examinations are</li> </ul>						

	No	СО	Assessment Object	Assessment Technique	Weight	
	1	CO1 -	Attendance	Documentation	10%	
		CO11	Individual Assignment/Group Assignment	Observation report	20%	
			Quiz	Precentation	20%	
			Midterm exams	Written test	20%	
			Final exams	Written test	30%	
				Total	100%	
Forms of media:	Boar	d, LCD F	Projector, Laptop/Com	puter		
Literature:	1. Howerl, David C. (1987). Statistical methods for Psychology. Boston :Duxbury Press.					
	<ol> <li>Pedhazur, E.J. (1982). Multiple Regression Bihavioral Research. New York : Holt, Rinehart and Wiston.</li> </ol>					
Date of revision	13 Ju	uly 2019				



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### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Electrical Power Protection					
Module level, if applicable:	Undergraduate					
Code:	EKO6225					
Sub-heading,if applicable:	-					
Classes,if applicable:	-					
Semester:	4 <sup>rd</sup>					
Module coordinator:	Dr. Edy Supriyadi					
Lecturer(s):	1. Ir.alex Sandria J. Wardhana,M.Eng 2. Totok Sukisno, S.Pd,M.Pd					
Language:	Bahasa Indonesia					
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course					
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.					
Teaching and Learning Method:	Discussion and Lecturing					
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.					
Credit points:	2					
Prerequisites course(s):	-					
Expected Learning Outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics</li> <li>ELO3 Capable to perform professional works in his/her field of expertise both individual and team works</li> </ul>					

	<ul> <li>ELO4 Master in basic sciences and principles of electric</li> <li>ELO7 Able to manage vocational education and training in the field of electrical engineering by utilizing information and communication technology</li> </ul>							
	CO1 Devotion to God Almighty, devout worship and noble deeds.							
	CO3	CO3 Demonstrates responsibility for work in their area of expertise independently						
Course Outcomes:	CO4	Knowled	ge of law	and the l	basic the	ory of electricity		
	CO7 Knowledge of the generation, distribution, installation and engineering of electric p automation in the business world and indust accordance with standards and principles that generally accepted and relevant in the fiel electricity and renewable energy.							
		ELO1	ELO3	ELO4	ELO7			
	CO1	✓						
ELO and CO mapping:	CO3		✓					
	CO4			✓				
	C07				✓			
Courses Description:	This Electric Power Protection Practice Lectures will develop student competencies regarding the need for Overcurrent Relays, Differential Relays, Voltage Relays, Power Relays, Temperature Relays, Power Breakers; Protection at substations, Transformer Protection, Transmission Network Protection, Distribution Network Protection, Motor Protection, and Building Protection. Lectures are carried out with a variety of discussions that are appropriate to the material and potential of students, including: contextual, project-based learning, and problem-based learning that is directed at learning at the student center. The assessment is carried out on a competency basis and is aligned with the lecture activities							
Study/exam achievements:	<ol> <li>basis and is aligned with the lecture activities.</li> <li>Assessment is carried out to measure all learning achievements, namely attainment learning achievements, knowledge, and special skills.</li> <li>Attitude assessment is carried out through direct observation of each student at each lecture meeting, including: attendance, discipline, personal and interpersonal interaction. This attitude assessment categories, namely: "Very Good", "Good", and "Less Good". The minimum attitude value is included in the "Good" category. By using observation and / or self-assessment techniques using the assumption that basically every student has a good attitude. The results of</li> </ol>							

	<ul> <li>this attitude assessment are used as a consideration for determining the final assessment of this course.</li> <li>3. The final grade includes the results of the knowledge assessment, and the specific skills obtained from individual assignments, group assignments, presentations, quizzes, insert tests, and final semester examinations are determined as follows.</li> </ul>							
	No	Assessment Technique	Weight					
	1	CO1 – CO7	Attendance	Documentation	10%			
			Individual / group assignments Midterm exam Final exams	Assignment Written test	45%			
			Individual / group assignments Midterm exam Final exams Final Exam	Assignment Written test written test	45%			
		L		Total	100%			
Forms of media:	Boar	d, LCD P	rojector, Laptop/Compu	ıter				
Literature:	<ol> <li>Board, ECD Projector, Eaptop/Computer</li> <li>Bonar Pandjaitan. 2012. <i>Praktik-Praktik Proteksi Sistem Tenaga Listrik</i>. Yogyakarta: Andi Offset.</li> <li>Christophe Prévé. 2006. <i>Protection of Electrical Networks</i>. London: ISTE,Ltd.</li> <li>Edy Supriyadi, 2000. <i>Sistem Proteksi Tenaga Listrik</i>. Yogyakarta: Adi Cita.</li> <li>Elmore Walter A. <i>Protective Relaying Theory &amp; Application</i>. New York: Marcell Dekker</li> <li>Lewis Blackburn &amp; Thomas J. Domin. 2006. <i>Protective Relaying: Principles and Applications</i>. Taylor&amp;Francis Group,LLC.</li> <li>PT. PLN (Persero) P3B. 2006. <i>Materi Pelatihan O&amp;M Relai Proteksi Jaringan</i>. Jakarta: PLN.</li> <li>Russel Mason. <i>The Art &amp; Science of Protective Relaying</i>. General Electric</li> <li>Scheinder electric. Sepam range Sepam 1000+ Substation Transformer Motor Busbar</li> </ol>							
Date of revision:	31 A	ugust 20'	19					



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### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Programmable Logic Controller Lab. Work
Module level, if applicable:	Undergraduate
Code:	EKO6327
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	4 <sup>th</sup>
Module coordinator:	Totok Heru Tri Maryadi, M. Pd.
Lecturer(s):	1. Sigit Yatmono, ST.,M.T. 2. Amelia Fauziah Husna,M. Pd.
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	150 minutes lectures, 180 minutes structured activities, and 180 minutes self-study per week.
Teaching and Learning Method	Presentation, Discussion, Question and Answer, Problem Based Learning, Problem Solving.
Workload:	Total workload is 136 hours per semester which consists of 150 minutes lectures, 180 minutes structured activities, and 180 minutes self-study per week for 16 weeks.
Credit points:	3
Prerequisites course(s):	-
Expected Learning Outcomes:	After taking this course the students have ability to: ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics ELO3 Can be handled according to the expertise of each team

	ELO5 Master in work standards, work methods, work implementations, and testing in electric power or industrial automation expertise.								
	le	ELO6 Capable to make plans, implement, and evaluate learning in electric power or industrial automation expertise							
		ELO9 Able to develop innovations in education, and publish the results of his work							
Course Outcomes:	CO1	CO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics							
	CO2	Demonstrate tolerance to		-	esponsibili vironmet	ty, and			
	CO2.1	Understand	PLC conf	iguration					
	CO2.2	Understand	the conce	ept of PLC	, PLC type				
	CO2.3	Understand	the input	and outpu	t modules				
	CO2.4	Understandi	ing PLC E	Basic Progr	ramming				
	CO2.5	Functin Bloc	k Diagrar	n					
	CO2.6	02.6 Ladder Diagram							
	CO2.7	PLC Applica	ation in Ind	dustry					
	CO4	CO4 Students can explain boolean basic logic instructions (AND, OR, and NOT) on PLC programming,							
	CO4.1								
	CO4.2	Understand	the conce	ept of PLC	, PLC type				
	CO4.3	Understand	the input	and outpu	t modules				
	CO4.4	Understandi	ing PLC E	Basic Progr	ramming				
	CO4.5	Functin Bloc	k Diagrar	n					
	CO4.6	Ladder Diag	Iram						
	CO4.7	PLC Applica	ation in Ind	dustry					
ELO and CO mapping:									
		ELO1	ELO3	ELO5	ELO6	ELO9			
	CO1	✓							
	CO2		✓	<b>√</b>					
	CO4				✓	$\checkmark$			
Courses Description:	control.	se discusses The discussio odules, memo put and anale	on includ ory flags, f	es compo timers, cou	nent input inters, arith	modules, metic, and			

	using	the problem based learning approach individually or in groups using practicum worksheets. Competency-based assessment at the end of the lecture individually.				
Assessments:	<ol> <li>Assessment is carried out to measure all learning achievements, namely attainment learning achievements, knowledge, and special skills.</li> <li>Attitude assessment is carried out through direct observation of each student at each lecture meeting, including: attendance, discipline, personal and interpersonal interaction. This attitude assessment categories, namely: "Very Good", "Good", and "Less Good". The minimum attitude value is included in the "Good" category. By using observation and / or self-assessment techniques using the assumption that basically every student has a good attitude. The results of this attitude assessment of this course.</li> <li>The final grade includes the results of the knowledge assessment, and the specific skills obtained from individual assignments, group assignments, presentations, quizzes, insert tests, and final semester examinations are determined as follows.</li> </ol>					
	No CO Assessment Object Assessment Technique					
	1 CO1 - CO4 -	Attitude	Documentation	10%		
				Individual Assignment/Group Assignment	Presentation	20%
			Mid	Practicum test	20%	
			Final Exam	Practicum test	40%	
				Total	100%	
Forms of media:	Boar	d. I CD P	rojector, Laptop/Compu	ter		
Literature:	<ol> <li>1 Tth. Electropneumatics. Jakarta: Festo.</li> <li>2 Tth. Pneumatics. Jakarta: Festo.</li> <li>3 tth. Programmable Logic Controller. Jakarta: Festo.</li> </ol>				ontroller. Konsep, a: Gava	

	<ol> <li>Brown, James. &amp; Lewis, Richard.(1983). AV Instructional Technology Manual For Independent Study (Sixth Edition). New York : McGraw-Hill.</li> <li>Brown, James.,Norberg &amp; Srygley.(1975). Administering Educational Media. New-York : McGraw-Hill.</li> </ol>
Date of revision	12 August 2019



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### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Industrial Electricity Installation			
Module level, if applicable:	Undergraduate			
Code:	EK06228			
Sub-heading,if applicable:	_			
Classes,if applicable:	-			
Semester:	4 <sup>th</sup>			
Module coordinator:	Alex Sandria Jaya W, S.Pd			
Lecturer(s):	1. Dr.Zamtinah,M.Pd 2. Dr.Ir.Djoko Laras Budiyo Taruno,M.Pd			
Language:	Bahasa Indonesia			
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course			
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week			
Teaching and Learning Method:	Discussion and Lecturing			
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.			
Credit points:	2			
Prerequisites course(s):	-			
Expected Learning Outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics</li> <li>ELO2 Demonstrate nationalism, responsibility, and tolerance to both society and environmet</li> </ul>			

	<ul> <li>ELO3 Capable to perform professional works in his/her field of expertise both individual and team works</li> <li>ELO4 Master in basic sciences and principles of electric</li> <li>ELO5 Master in work standards, work methods, work implementations, and testing in electric power or industrial automation expertise.</li> <li>ELO6 Capable to make plans, implement, and evaluate learning in electric power or industrial automation expertise</li> </ul>						
Course Outcomes:	CO1 CO2 CO3 CO4	Devoted and char Students motivatio Students generatio Having the the right	acter, agree to on to deve can ma on system he ability	be active lop them nage the from the to speak	, respons selves, e operatio generation	ible, and l on of the or to the u	have the e power user.
ELO and CO mapping:	CO1 CO2 CO3 CO4	ELO1 ✓	ELO2	ELO3	ELO4	ELO5	ELO6
Courses Description:	This course discusses the completion of industrial electrical installations. Coverage of materials in this course covers materials and equipment for industrial electrical installations, protection systems, installation and applicable installation requirements, wiring diagrams and single lines in industrial electrical installations, lighting and power installations in industry, setting conductor and distribution capacity, feeders and panels, medium voltage protection systems, power factor improvements and capacitor installation techniques, grounding systems and lightning rods in Indonesia as well as the commissioning test.						
Study/exam achievements:	<ol> <li>commissioning test.</li> <li>Assessment is carried out to measure all learning achievements, namely attainment learning achievements, knowledge, and special skills.</li> <li>Attitude assessment is carried out through direct observation of each student at each lecture meeting, including: attendance, discipline, personal and interpersonal interaction. This attitude assessment categories, namely: "Very Good", "Good", and "Less Good". The minimum attitude value is included in the "Good" category. By using observation and / or self-</li> </ol>						

	<ul> <li>assessment techniques using the assumption that basically every student has a good attitude. The results of this attitude assessment are used as a consideration for determining the final assessment of this course.</li> <li>3. The final grade includes the results of the knowledge assessment, and the specific skills obtained from individual assignments, group assignments, presentations, quizzes, insert tests, and final semester examinations are determined as follows.</li> </ul>			s of this ration for nowledge individual quizzes,		
	No	СО	Assessment Object	Assessment Technique	Weight	
	1	CO1-	Attendance	Documentation	10%	
		CO4	Assignment	Presentation	20%	
			Mid Exam	written test	30%	
			Final Exam	written test	40%	
		Total 1				
Forms of media:	Board, LCD Projector, Laptop/Computer					
Literature:	<ol> <li>Scheneider Electric Indonesia. (2002). Panduan Aplikasi Teknis. PT. Scheneider Indonesia.</li> <li>Ir. Imam Sugandi, dkk. Panduan Instalasi Listrik Untuk Rumah. Yayasan Usaha Penunjang Tenaga Listrik: Jakarta.</li> <li>John Wiley &amp; Sons. (2000). Electrical Installation</li> </ol>			rik Untuk a Listrik:		
			k. Publicis MCD Verlag			
			. Smith & Stephen L. H dustrial 7 <sup>th</sup> Edition. Deln		Electrical	
	5. Ray C. Mullin & Robert L. Smith. (200 Commercial 7 <sup>th</sup> Edition. Delmar.		. (2002). Electric	al Wiring:		
Date of revision:	31 A	ugust 20'	19			



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### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Industrial Electricity Installation Lab. Work			
Module level, if applicable:	Undergraduate			
Code:	EKO6229			
Sub-heading,if applicable:	-			
Classes,if applicable:	-			
Semester:	4 <sup>th</sup>			
Module coordinator:	Alex Sandria Jaya W, S.Pd			
Lecturer(s):	1. Dr.Zamtinah,M.Pd 2. Dr.Ir.Djoko Laras Budiyo Taruno,M.Pd			
Language:	Bahasa Indonesia			
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course			
Teaching format / class hours per week during the semester:	200 minutes lectures and 240 minutes structured activities per week			
Teaching and Learning Method:	Discussion, Demonstration, and Lecturing			
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.			
Credit points:	2			
Prerequisites course(s):	-			
Expected Learning Outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty t academic values, norms, and ethics</li> <li>ELO3 Capable to perform professional works in his/her field or expertise both individual and team works</li> </ul>			

	in in ELO7 A fie	laster in work standards, work methods, work nplementations, and testing in electric power or dustrial automation expertise. ble to manage vocational education and training in the eld of Electrical Engineering by utilizing information nd communication technology
	CO1	Devoted to God and able to show a religious attitude and character.
Course Outcomes:	CO2	Demonstrates responsibility for work in their area of expertise independently.
	CO3	Knowledge of the preparation of scientific works including work reports in accordance with scientific procedures based on data and information analysis.
	CO3.1	Understand the characteristics and working principles of the components used in industrial electrical installations
	CO3.2	Mastering the concept of controlling industrial electricity loads both conventional and based on automation systems (PLCs)
	CO4	Apply automation techniques for the purposes of electrical and renewable energy (magnetic contactors, power electronics, PLCs, and microcontrollers).
	CO4.1.	Assembling a 3 phase motor control system on the panel box (fwd-rev) manually and automatically
	CO4.2.	Arranging the 3-phase motor control system on the panel box (star-delta) manually and automatically
	CO4.3.	Creating PLC-based control programs and applying to industrial electrical installation systems.
	CO5	Applying the concept of electric power quality to improve the profile of electric power.
	CO5.1.	Arranging and analyzing power factor regulators
	CO5.2.	Arranging and analyzing Automatic Main Failure (AMF) and Automatic Transfer Switch (ATS) systems

			ELO1	ELO3	ELO5	ELO7	
	C	<b>D</b> 1	✓				
ELO and CO mapping:	C	<b>D</b> 2		✓			
	C	<b>D</b> 3			✓		
	C	<b>D</b> 4				✓	
	C	<b>D</b> 5				<ul> <li>✓</li> </ul>	
Courses Description:	This course practices the application of industrial electric installations ranging from security systems to automation electrical installations in industry. The scope of material in the course covers the complete electrical components common used in industry, manual and automatic 3-phase mode controllers, power factor improvements using bank capacities with manual or automatic settings, automatic main failures main network backup (PLN) compilation automatic and re based shutdown, 20 kv medium voltage protection system a industrial installation based on programmable logic conte (PLC).					mation of crial in this commonly se motor capacitors ailures as and relay stem and	
Study/exam achievements:	<ol> <li>Assessment is carried out to measure all learning achievements, namely attainment learning achievements, knowledge, and special skills.</li> <li>Attitude assessment is carried out through direct observation of each student at each lecture meeting, including: attendance, discipline, personal and interpersonal interaction. This attitude assessment categories, namely: "Very Good", "Good", and "Less Good". The minimum attitude value is included in the "Good" category. By using observation and / or self-assessment techniques using the assumption that basically every student has a good attitude. The results of this attitude assessment are used as a consideration for determining the final assessment of this course.</li> <li>The final grade includes the results of the knowledge assessment, and the specific skills obtained from individual assignments, group assignments, presentations, quizzes,</li> </ol>					evements, gh direct meeting, hal and sessment and "Less ed in the / or self- t basically its of this ration for mowledge individual , quizzes,	
	No	со	Asse	ssment Obje		sessment chnique	Weight
	1	CO1 -	– Attitu	de		cumentation	10%
		CO5		dual nment/Group nment		servation ort	20%
		Quiz			curacy of gram results/	20%	

			Written		
		Mid	Practicum test	20%	
		Final Exam	Practicum test	30%	
			Total	100%	
Forms of media:	Board, LCD Pro	ojector, Laptop/Compu	uter		
	1. Tim Instalasi. Jobsheet Praktik Instalasi Listrik In				
	<ol> <li>Ir. Imam Sugandi, dkk. Panduan Instalasi Listrik Untuk Rumah. Yayasan Usaha Penunjang Tenaga Listrik: Jakarta.</li> </ol>				
	<ol> <li>John Wiley &amp; Sons. (2000). Electrical Installation Handbook. Publicis MCD Verlag: Munich.</li> </ol>				
Literature:	4. Robert L. Smith & Stephen L. Herman. (2002). Electrical Wiring Industrial 7 <sup>th</sup> Edition. Delmar.				
	<ol> <li>Ronald P. O'Riley. (1988). Electrical Grounding. Delmai Publishesrs Inc.</li> </ol>				
		er Electric Indonesia. 7. Scheneider Indones		n Aplikasi	
Date of revision:	31 August 2019				



FACULTY OF ENGINEERING DEPARTMENT OF ELECTRICAL ENGINEERING EDUCATION Jalan Colombo Nomor 1 Yogyakarta 55281 Telephone (0274) 586168 ext 276,289,292 , (0274) 586734 , Fax (0274) 586734 Web:ft.uny.ac.id, E-mail: <u>elektro@uny.ac.id</u>

### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Industrial Management			
Module level, if applicable:	Undergraduate			
Code:	EKO6230			
Sub-heading,if applicable:	-			
Classes,if applicable:	-			
Semester:	4 <sup>th</sup>			
Module coordinator:	Muhamad Ali, M.T.			
Lecturer(s):	Team			
Language:	Bahasa Indonesia			
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course			
Teaching format / class hours per week during the semester:	100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week.			
Teaching and Learning Method	Presentation, Discussion, Question and Answer, Problem Based Learning, Problem Solving.			
Workload:	Total workload is 90 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.			
Credit points:	2			
Prerequisites course(s):	-			
Expected Learning	After taking this course the students have ability to:			
Outcomes:	ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics			
	ELO3 Can carry out work in accordance with the professional field of expertise both individually and in teams			
	ELO4 Mastering basic science and basic electricity			

		le to plan, implement, and evaluate learning in the d of electric power or automation
Course Outcomes	CO1	Thanks to God and able to show a religious attitude and character,
	CO3	Demonstrates responsibility for work in their area of expertise independently.
	CO4	Knowledge of the principles of industrial management relating to the work of prospective electric power engineering and automation engineering teachers
	CO4.1	Knowledge of law and the basic theory of electricity.
	CO4.2	Understand industrial management and its development.
	CO4.3	Understanding decision making.
	CO4.4	Understand operations and production management
	CO4.5	Understand the principles of layout and ergonomics in work in industry
	CO4.6	Understand quality management
	CO4.7	Understand human resource management
	CO4.8	Understanding information systems management
	CO4.9	Understand business development in the industrial era 4.0
	CO5	Analyze and solve management problems related to electrical engineering work by applying the principles of industrial management.
	CO5.1	Apply mathematical principles especially in linear and differential equations to solve optimization problems in industrial management.
	CO5.2	Model industrial management
	CO4.3	Analyze the decision making process in operations and production management.
	CO4.4	Analyzing working procedures and ergonomics
	CO5.5	Analyzing quality management of electrical work
	CO5.6	Develop human resource management for industries in Indonesia
	CO5.7	Identifying problems related to industrial management

	CO6	Apply organiza	industrial ations.	manage	ement th	eory to
	CO6.1		ndustrial r o electrical			to work
ELO and CO mapping:		ELO1	ELO3	ELO4	ELO7	
	CO1	✓				
	CO2		✓			
	CO3			<b>~</b>		
	CO4			<b>~</b>		
	CO5				✓	
	CO6				✓	
Accoremente:	of technicians and electrical engineering teachers to understand the conditions of the workforce and industry in general. The material covered includes management and organization, the development of management theory, decision making, management styles, industrial production processes, work procedures, work culture, quality management, human resource management and information systems management. After completing this lecture, students are expected to have insight, knowledge, skills and attitudes that can increase work effectiveness and efficiency in order to achieve organizational goals by optimizing available resources. Lectures are carried out using the student center learning approach. Competency- based assessment involves active participation, and communication of interactions between individuals and groups.					
Assessments:	<ul> <li>based assessment involves active participation, and communication of interactions between individuals and groups</li> <li>1. Assessment is carried out to measure all learning achievements, namely attainment learning achievements knowledge, and special skills.</li> <li>2. Attitude assessment is carried out through direct observation of each student at each lecture meeting</li> </ul>				ievements, ugh direct e meeting, onal and ssessment and "Less ded in the / or self- at basically ults of this eration for knowledge	

			sts, and final sen d as follows.	nester examinat	ions are	
	No	СО	Assessment Object	Assessment Technique	Weight	
	1	CO1 - CO7	Active in class Duty Discussion Presentation	Observation Rubric Observation Rubric	15%	
			Quiz Duty UTS Final exams Presentation	Test Rubric Test Test Rubric	50%	
			Draw SLD Count manually Analyzing with software Discussion Presentation	Duty Test Duty Rubric Rubric	35%	
				Total	100%	
Forms of media: Literature:		. Hani Badan	rojector, Laptop/Com Handoko (2012), M Penerbitan Fak sitas Gadjah Mada Yo	anagement, Edis ultas Ekonomi	(BPFE)	
	<ol> <li>Joan Magretta, (2012), What Management Is, CF Group (UK) Ltd. Croydon, Great Britain</li> <li>Koontz, H, Weinrich H (2015). Management: A Globa Perspective, McGraw Hill New York</li> </ol>					
	4		nad Ali, (2017). Mana Press Universitas Neg esia	-		
	5		alaksana, dkk (1997). Bandung	Teknik Tata Kerja	i, Ganexa	
	6		d, 2015, Sistem infor bit Salemba empat, Ja		Edisi 10,	
	7		referensi dari paper emen industri	dan Journal terka	it dengan	
Date of revision	06 Ju	ıly 2019				



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#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Counseling Guidance					
Module level, if applicable:	Undergraduate					
Code:	MDK6205					
Sub-heading,if applicable:	-					
Classes,if applicable:	-					
Semester:	4 <sup>th</sup>					
Module coordinator:	Mutaqin, M.Pd., M.T.					
Lecturer(s):	<ol> <li>Dr. Edy Supriyadi</li> <li>Dr. Ketut Ima Ismara, M.Pd., M.Kes.</li> </ol>					
Language:	Bahasa Indonesia					
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course					
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.					
Teaching and Learning Method	Discussion					
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.					
Credit points:	2					
Prerequisites course(s):	-					
Expected learning outcomes:	After taking this course the students have ability to: ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics					

		monstrate nationalism responsibility and televanes
	to	emonstrate nationalism, responsibility, and tolerance both society and environmet
		apable to perform professional works in his/her field of opertise both individual and team works
	im er	lastering work standards, work methods, work plementation, and testing in the field of electric power ngineering or industrial automation.
		apable to develop a vocational education innovation ad publish scientific paper
	CO1	Devoted to God who is almighty and capable of showing religious attitude and character,
	CO2	Demonstrate an attitude of nationalism, responsibility, and tolerance towards society and the environment
	CO2.1	Uphold the value of humanity in carrying out duties based on religion, morals, and ethics.
	CO3	Internalize academic values, norms and ethics.
	CO3.1	Mahami launches courses and the importance of Career Guidance, the meanings and functions of Career Guidance
	CO6	Knowledge of the preparation of scientific works including work reports in accordance with scientific procedures based on data and information analysis.
Course Outcomes:	CO6.1	Understand the meaning, purpose and function of career guidance and the development of career guidance phases
	CO6.2	Knowing the achievement of understanding of the Career Guidance material
	CO6.3	Having knowledge about the importance of job information
	CO6.4	Having information about job sources Understand labor theory and have job analysis skills
	C07	Apply logical, critical, systematic, and innovative thinking in the context of developing or implementing science and / or technology in accordance with their area of expertise.
	CO7.1	Have an understanding of the scope of Career Guidance on the methods of implementing Career Guidance
	CO7.2	Knowing the factors that influence the need for Career Guidance, the pattern of implementing

	CO6 CO7				✓	✓		
	CO5			✓				
	CO4							
ELO and CO mapping	CO3			<b>~</b>				
	CO2		✓					
	CO1	<ul> <li>✓</li> </ul>						
		ELO1	ELO2	ELO3	ELO4	ELO9		
	0010.1	Understand the organization, administration, and evaluation of Career Guidance, able to make job applications						
	CO10.4		ent follow-und the org	•	administra	ation and		
	CO10.3	Ability to	explain the	e concepts	s of work p	lacement		
	CO10.2	•	an under having rea	•	of recruit nterview	tment of		
	CO10.1	•	y to explain in counsel	•	ssion of a c ques	ounselor,		
	CO10 Compile reports of Scientific Works in accordan with scientific procedures based on analys information and data and be able to interpret and communicate accurately and accountably in ord to solve problems and phenomena that occur related to the profession.				analysis, erpret and y in order			
	CO9.1 Identifying new business opportunities that ca developed							
	CO9 Make decisions appropriately in the contex problem solving in their area of expertise, base the results of an analysis of information and de				based on Ind data.			
	CO8.1	a job info	rmation so	urce	at is dream	-		
		implementation of science, technology or art in accordance with their expertise based on rules, procedures and scientific ethics to produce solutions, ideas, designs, or art criticisms and compile scientific descriptions of the results of their studies in the form of thesis or final project report.						
	CO7.5				the develo			
	CO7.3		I guidance		to Career	Guidance		

	C	08					✓
	С	09					✓
	CC	D10					✓
Courses Description:	Guidance and Counseling, is a science and skills course. This course develops student understanding (prospective subject teachers / fields of study) about guidance and counseling in schools and the role of subject teachers / fields of study in guidance and counseling services in schools.						
	2. / i i 0 0 0 1 2 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2	achieve knowled Attitude observa ncluding nterpers categori Good". Good" Good" assessn attitude determin The fina assessn assignm nsert	ments, n lge, and assess tion of g: atte sonal i es, nan The mir categor nent tech tudent h assess ning the al grade nent, and nents, gr tests, a	amely attair special skills sment is each stude endance, nteraction. nely: "Very nimum attitu y. By using niques using as a good ment are u final assess includes the the specific oup assignn	nment s. carried ent at discipl This Good ude va g the as attituc used a ment o he res c skills o nents,	measure a learning ach out throu each lecture ine, perso attitude a ", "Good", lue is inclue rvation and ssumption the sumption the sumption the sumption the sumption the sumption the presentation presentation er examina	ievements, ugh direct e meeting, onal and ssessment and "Less ded in the / or self- at basically ults of this eration for knowledge n individual s, quizzes,
Assessments:	C	determir	ned as fo	ollows.			
Assessments:	No			ollows. essment Obje		Assessment Technique	Weight
Assessments:		<b>CO</b>	Asse		ect /		
Assessments:	No	СО	Asse Prese	essment Objentation	ect	Technique	Weight
Assessments:	No	<b>CO</b>	Asse Prese Assign	essment Objentation	ect A C ual/ F	Technique Observation	Weight
Assessments:	No	<b>CO</b>	Asse Prese Assign group	essment Object	ect / c ual/ F	Technique Observation Presentation Accuracy of program esults	Weight 10% 20%
Assessments:	No	<b>CO</b>	Assign Prese Assign group Quiz	essment Object Intation Inment individe Intation	ect / ual/ F	Technique Observation Presentation Accuracy of orogram esults Vritten	Weight           10%           20%           20%

Forms of media:	Board, LCD Projector, Laptop/Computer
	<ol> <li>Antje Barabasch, Felix Rauner. (2012). Work and Education in America. German: Universitas of Bremen</li> </ol>
	<ol> <li>Dewa Ketut Sukardi. (1995). Bimbingan Karier di Sekolah-sekolah. Jakarta : Ghalia Indonesia.</li> </ol>
	<ol> <li>Hoppock, Robert. (1976) Occupational Information. New York : McGraw –Hill, Book Co.</li> </ol>
	<ol> <li>James A. Athanasou, Raul Van Ebroek. (2008). Internatioal Handbook of Career Guidance. Belgium: Springer</li> </ol>
Literature:	<ol> <li>Mohammad Thayeb Manribu. (1988). Pengantar Bimbingan dan Konseling Kejuruan. Jakarta : P2LPTK Ditjen Dikti.</li> </ol>
	<ol> <li>Stephen Billet. (2011). Vocational Education, Purposes, Traditions, and Prospects. Quiqland: Sripnger.</li> </ol>
	<ol> <li>Xueeping Wu, Yiqun Ye. (2018). Technical and Vocational Education in China. Beijing: Springer</li> </ol>
	<ol> <li>Valerie Cohen-Scali, Jerome Rossier, Laura Nota (2018). New Perpective on Career Counseling and Guidance in Europe, Building Careers in Changing and Diverse Sociaties. Paris: Springer.</li> </ol>
	<ol> <li>Stephen Billet. (2011). Vocational Education, Purposes, Traditions, and Prospects. Quiqland: Sripnger.</li> </ol>
Date of revision	10 August 2019



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#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Electrical Power System Analysis				
Module level, if applicable:	Undergraduate				
Code:	EKO6231				
Sub-heading,if applicable:	-				
Classes,if applicable:	-				
Semester:	4 <sup>th</sup>				
Module coordinator:	Ir. Muhamad Ali, M.T.				
Lecturer(s):	Team				
Language:	Bahasa Indonesia				
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course				
Teaching format / class hours per week during the semester:	100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week.				
Teaching and Learning Method	Presentation, Discussion, Question and Answer, Problem Based Learning, Problem Solving.				
Workload:	Total workload is 90 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.				
Credit points:	2				
Prerequisites course(s):	-				
Expected Learning Outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics</li> <li>ELO4 Master in basic sciences and principles of electric</li> <li>ELO7 Able to manage vocational education and training in the field of Electrical Engineering by utilizing information</li> </ul>				

	ge er bu st ar	nd communication technology. Knowledge of the eneration, distribution, use, installation and agineering of electric power automation in the usiness world and industry in accordance with the andards and principles that are generally accepted and relevant in the field of electricity and renewable nergy.
Course Outcomes:	CO1	Thanks to God and able to show a religious attitude and character,
	CO2	Students actively participate, take responsibility, and have the motivation to develop themselves,
	CO3	Mastering knowledge about the principles of Mathematics and Physics related to the principles of electricity
	CO3.1	Understanding the principles of Mathematics in particular trigonometry, differentials, and integrals in electrical machines.
	CO3.2	Understand the principles of electricity and its relation to the operation and analysis of the electric power system.
	CO4	Knowledge of law and the basic theory of electricity. Understanding the components of the electric power system.
	CO4.1	Understanding the modeling of electric power systems with a Single Line Diagram.
	CO4.2	Understanding the types of interference in the electric power system
	CO4.3	Understanding load flow in electric power systems
	CO4.4	Understand short circuit interference in electric power systems
	CO4.5	Understand the improvement of power factors and voltage profiles in the electric power system
	CO4.6	Understand losses in the electric power system
	CO4.7	Understand the principles of electric power system optimization
	CO4.8	Understand the improvement of power factors and voltage profiles in the electric power system
	CO5	Analyze and solve technical problems related to electrical engineering by applying mathematical principles.
	CO5.1	Apply mathematical principles, especially

			num			near equin electric		
	CO5.2			el an elec e line dai		system ir	n the form	of a
	CO5.3		Analyzing due to interference with the electric power system.					
	CO5.4		Analyzing load flow on an electric power system.					
	CO5.5			• •		in powe		
	CO5.6			gning pro electric po		system co m	oordinatio	n in
	CO5.7			tify power lve them	system lo	osses and	find solut	ions
	CO	6		ying the th er system	-	lectric circ	uits to ele	ectric
	CO	6.1	powe gene	er syste	ems, ind ransmissi	on, disti	those f	ectric from and
ELO and CO mapping:				EL O1	EL O3		EL OZ	1
ELO and CO mapping:		C	01	ELO1	ELO3	ELO4	ELO7	]
ELO and CO mapping:			:01 :02		ELO3		ELO7	-
ELO and CO mapping:		С	02				ELO7	-
ELO and CO mapping:		C C				ELO4	ELO7	-
ELO and CO mapping:		C C C	:02 :03			ELO4	EL07	-
ELO and CO mapping:		C C C C	:02 :03 :04			ELO4	EL07	-

			nvolves active partic between individuals		ommunicat
Assessments:	a k 2. / 0 ii ii 0 0 0 0 3. T a a ii	achievem knowledg Attitude observation ncluding: nterperso categories Good". T Good" c assessme avery stu attitude a determinin The final assessme assignme nsert te		rried out the at each lected scipline, per his attitude Good", "Good" e value is inc observation ar he assumption ttitude. The re ed as a conse results of the kills obtained fr nts, presentatio	chievemer rough dir ure meetii rsonal a assessm , and "Le luded in nd / or so that basica esults of t sideration se. e knowlec om individ ons, quizz
	No	со	Assessment Object	Assessment Technique	Weight
	1	CO1 – CO9	Attitude	Observation Rubric Observation Rubric	15%
			Individual Assignment/Group Assignment Mid Exam Final Exam	Test Rubric Test Test Rubric	50%
			Draw SLD Count manually Analyzing with software Discussion	Duty Test Duty Rubric Rubric	35%
			Presentation		

Forms of media:	Board, LCD Projector, Laptop/Computer
Literature:	<ol> <li>Muhamad Ali, 2016, Analisis dan Optimasi Sistem Tenaga Listrik, Penerbit UNY Press, Yogyakarta</li> </ol>
	<ol> <li>Stevenson, William D, 1984. Analisis Sistem Tenaga Listrik, Jakarta. Penerbit Erlangga</li> </ol>
	<ol> <li>Lazaar, Irwin, 1980. Electrical System Analysis and Design for Industrial Plants. New York. McGraw - Hill Book Company.</li> </ol>
	<ol> <li>Grainger John J. and Stevenson, William D 1994, Power System Analysis. Singapore. McGraw – Hill</li> </ol>
	<ol> <li>S. Ramar and S. Kuruseelam, 2013, Power System Analysis, PHI Learning Private Limited, New Delhi India</li> </ol>
	<ol> <li>Hemchandra Madhusudan Shertukde, 2019, Power Systems Analysis Illustrated with MATLAB and ETAP, ISBN 9781498797214, CRC Press, Taylor and Francis Group</li> </ol>
	<ol> <li>Aneka referensi Jurnal Ilmiah tentang Analisis Sistem Tenaga Listrik</li> </ol>
Date of revision	08 August 2019



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#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Intelligent Control System						
Module level, if applicable:	Undergraduate						
Code:	EKO6235						
Sub-heading,if applicable:	-						
Classes,if applicable:	-						
Semester:	4 <sup>th</sup>						
Module coordinator:	Dr. Haryanto, M.Pd., M.T.						
Lecturer(s):	Team						
Language:	Bahasa Indonesia						
Classification within the curriculum:	Compulsory/Elective Course						
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.						
Teaching and Learning Method	Discussion and Lecturing						
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.						
Credit points:	2						
Prerequisites course(s):	-						
	After taking this course the students have ability to:						
Expected learning outcomes:	ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics.						
	ELO2 Demonstrate nationalism, responsibility, and tolerance to both society and environmet.						

	ELO4							
	ELO7	Apply auto electrical contactors, microcontre	and rer power	newable	•	magnetic		
	ELO9	Assessing implementa accordance procedures solutions, compile sc studies in t	ation of s e with their s and so ideas, de ientific des	cience, te expertise cientific e signs, or criptions c	chnology based on ethics to art critic of the resul	or art in the rules, produce ism and ts of their		
	CO1	attitude a		cter that	able to shov is implem s.			
	CO2	Contribut communi	e to ir ty, nation	nproving , and state	•	ality of		
	CO2.1	the progr	ess of civi	lization ba	ased on Pa	ancasila.		
	CO4	•	Knowledge of law and the basic theory of electricity.					
Course outcomes:	CO4.1		The use of laws and theories of intelligent control systems for the process of controlling electricity.					
	C07	to develo	Using information and communication technology to develop intelligent-based automation systems with microcontrollers or microcomputers as a means.					
	CO9	O9 Apply science and technology skills to produce solutions, ideas, designs for technology and vocational education in the field of Electrical Engineering both theory and practice through the use of IT and various artificial intelligence techniques both in the form of application systems and thesis or final project reports.						
		ELO1	ELO2	ELO4	ELO7	ELO9		
	C01	✓						
ELO and CO mapping:	CO2		✓					
	CO4			✓				
	C07				✓			
	CO9					$\checkmark$		

Courses Description:	Intelligent Control System lectures to develop the ability of students to be able to develop control systems for control machines and or electronic / electrical equipment and be able to implement them for various control processes by prioritizing the principles of improving the performance of intelligent control systems based on fuzzy logic (LF), networks artificial nerves (ANN) and genetic algorithms (AG), both software and hardware-software. Lectures are carried out using the student center learning approach, with problem based and case based learning models. Competency-based assessment involves active participation, individual and group assignments, midterms and final semester exams.							
Assessment:	<ol> <li>Assessment is carried out to measure all lear achievements, namely attainment learning achievements knowledge, and special skills.</li> <li>Attitude assessment is carried out through do observation of each student at each lecture meet including: attendance, discipline, personal interpersonal interaction. This attitude assess categories, namely: "Very Good", "Good", and "I Good". The minimum attitude value is included in "Good" category. By using observation and / or assessment techniques using the assumption that basis every student has a good attitude. The results of attitude assessment are used as a consideration determining the final assessment of this course.</li> <li>The final grade includes the results of the knowle assessment, and the specific skills obtained from indivit assignments, group assignments, presentations, quiz insert tests, and final semester examinations</li> </ol>							
	No	СО	Assessment Object	Assessment Technique	Weight			
	1	CO1 - CO4	Attendance	Documentation	10%			
			Assignment	Written test	20%			
			Midterm exams	Written test	30%			
			Final exams	Written test	40%			
				Total	100%			
Forms of media:	Board	d, LCD F	Projector, Laptop/Com	puter				
Literature:	<ol> <li>Ghalnaraghi, F., and Kuo, B. 2010. Automatic control systems, USA: John Wesley Addison.</li> <li>Horváth, G. 2002. Neural networks for system modeling. Hongaria: Budapes University Press.</li> </ol>							

	<ol> <li>Klir, G,J., &amp; Yuan, B. 2005. Fuzzy sets and fuzzy logic, theory and applications. NJ: PHI Inc.</li> </ol>
	<ol> <li>Luger. 2005. Artificial intelligence. USA: John Wesley Addison.</li> </ol>
	<ol><li>Mitchell Melanie, M. 1999. An introduction to genetic algorithms. USA: MIT Press.</li></ol>
	<ol> <li>Nagy, Z. 2018. Artificial intelligence and machine learning fundamentals. UK: Pack Publishing.</li> </ol>
	<ol> <li>Nie, J. &amp; Linkens, D. (1995). Fuzzy-neural control: principles, algorithms and applications. New Jersey: Prentice Hall Inc.</li> </ol>
	<ol> <li>Sukla, R.C. (2001). Control Systems. Delhi: Dhanpat Rai &amp; Co. (Pvt.) Ltd.</li> </ol>
Date of revision	13 July 2019





FACULTY OF ENGINEERING DEPARTMENT OF ELECTRICAL ENGINEERING EDUCATION Jalan Colombo Nomor 1 Yogyakarta 55281 Telephone (0274) 586168 ext 276,289,292, (0274) 586734, Fax (0274) 586734 Web:ft.uny.ac.id, E-mail: <u>elektro@uny.ac.id</u>

### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Instructional Media
Module level, if applicable:	Undergraduate
Code:	KTF6203
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	5 <sup>th</sup>
Module coordinator:	Dr. Sunaryo Soenarto, M.Pd.
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Discussion, Demostration, and Lecturing
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.

Credit points:	2							
Prerequisites course(s):	-							
	ELO1 Dem	this course the students have ability to: nonstrate piousness to God, high loyalty to						
Expected learning outcomes:	ELO2 Kno strat voca	demic values, norms, and ethics. wledge of the concepts of developing learning tegies, and learning media for technology and ational education in the field of Electrical ineering.						
		e to plan, train, and study the fields of electrical or mation engineering used.						
	field	to manage vocational education and training in the of Electrical Engineering by utilizing information communication technology						
		tudents who are dedicated to Allah SWT and are ble to show attitudes and character regius.						
		tudents agree to be active, responsible, and have otivation to develop themselves,						
	th fu	xplain the relationship between communication eory, and also learning theory understanding, nctions, benefits, advantages and disadvantages learning media						
		heck the taxonomies of various vocational learning edia						
Course Outcomes:		nalyzing the strengths and weaknesses of various arning media						
		pply the concept of developing printed teaching aterials						
		pplying the basic principles of photography in arning media						
	CO2.5 Im	nplement a learning video production program						
	m	tudents are able to communicate effective essages, think critically and make the right ecisions,						

	CO3.1 Students are able to compile a script of a video learning program								
	CO4	CO4 Students are trained in managing electronic media and conventional media							
	CO4	CO4.1 Students are able to work in groups in synergy in producing instructional video media,							
			ELO1	ELO2	ELO3	ELO4			
		CO1	✓						
ELO and CO mapping:		CO2		~			-		
		CO3			✓		-		
		CO4				✓			
Courses Description:	This course discusses the development of contextual thinking (in accordance with study programs in the studio) and elements of learning media. The main study discusses: concept communication, learning communication, information technology, functions and benefits of instructional media, as well as conventional instructional economic media, model development, instructional design. Examining printed and electronic learning media applications such as posters, photos, videos, audio visual and multimedia. Learn the rules, structure and methods of media development (4D and ADDIE). Lectures are carried out by agreeing to student learning centers and production media independently. Competency-based assessment and sponsored performance and active communication.								
	achie 1), ge	evements,	ls (CO 2),	tainment le	measure earning act e (CO 3), a	nievements	•		
Assessments:	1. Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using considerations on each student having a good attitude. Read more about like, good, and very good attitude. Assessment results are not a component of a student's final grade, approved as one of the graduation requirements. Students who will graduate from this course have a minimum of good attitude. Attitude assessment also considers the activeness of students following lectures.								

	<ul><li>2. Final grades complete the results of knowledge, general skills, and special skills obtained from individual assignments, group assignments, Midterm Exams, presentations and final products with the following guidelines.</li><li>The final mark will be weight as follow:</li></ul>							
	No	Assessment Technique	Weight					
	1	CO3 CO4	Presentation	Observation	30%			
		CO5	Individual task	Accuracy of results with task criteria	25%			
			Group task	Accuracy of results with task criteria	25%			
			Mid	Written test	20%			
				Total	100%			
Forms of media:	Boar	d, LCD F	Projector, Laptop/Com	puter				
Literature:	2. 3. 4. 5.	<ul> <li>Raja Grafindo Persada.</li> <li>3. Chapman, Nigel and Jenny Chapman.(2004). <i>Digital Multimedia</i>. England: John Wiley &amp; Sons Ltd.</li> <li>4. Heinrich,R., Molenda,M. and Russel. (1982). Instructional Media. New York: John Willey &amp; Sons.</li> </ul>						
	<ol> <li>Sunaryo Soenarto dkk. (2012). Media Pembelajara Teknologi dan Kejuruan, Yogyakarta: FT UNY.</li> </ol>							

	8. Yunardi. (2002). Belajar Sendiri Adobe Photoshop 6,0. Surabaya: Indah.
Date of revision	30 August 2018



#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Curriculum and Instructional of Vocational
Module level,if applicable:	Undergraduate
Code:	KTF6201
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	5 <sup>th</sup>
Module coordinator:	Dr. Sunaryo Soenarto, M.Pd.
Lecturer(s):	<ol> <li>Dr. Istanto Wahyu Djatmiko</li> <li>Dr. Edy Supriyadi, M.Pd.</li> </ol>
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Discussion, Observation, and Lecturing
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.

Credit points:	2								
Prerequisites course(s):	-	-							
Expected learning outcomes:	ELO1 [ ELO3 ( f ELO8 /	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics</li> <li>ELO3 Can carry out work in accordance with the professional field of expertise both individually and in teams</li> <li>ELO8 Able to apply research methods and compile Scientific work</li> </ul>							
Course Outcomes:	<ul> <li>CO1 Devotion to God Almighty and able to show religious attitude</li> <li>CO2 Demonstrates a responsible and independent attitude towards the assigned work</li> <li>CO3 Demonstrates responsibility for work in their area of expertise independently</li> <li>CO4 Understand comprehensively the concepts of planning, implementing, and evaluating curriculum and being able to apply it in the development of vocational education curriculum.</li> </ul>								
		C01	ELO1	ELO3	ELO8				
ELO and CO mapping		CO2	<b>~</b>			-			
		CO3		~					
		CO4			~				
Courses Description:	This course equips students with the ability to comprehensively understand the concepts of planning, implementing, and evaluating curriculum and being able to apply it in the development of vocational education curriculum. The course generally contains material about the definition, dimensions, functions, and role of the curriculum; foundation of curriculum development; curriculum development components; principles of curriculum development; curriculum development and organization models; vocational learning approaches,								

	strategies and models. Lectures are carried out both with lectures, class and group discussions which are equipped with the assignment of observations and critical analysis of the practices of vocational education curriculum development.							
	outco	omes, name		to measure al omes related to ecial Skills.	•			
	Attitude assessment is carried out integrated in learning at each meeting using observation techniques. Basically every student has a good attitude. The student is given the value of a very good attitude or not good if it shows significantly better or less good attitude compared to the attitude of students in general. The results of the attitude assessment are not a component of the student's final grade, but rather as one of the graduation requirements. Students will graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness of students following lectures The final mark will be weight as follow:							
Assessment:	No CO Assessment Assessment Wo Object Technique							
	1	CO1 - CO4	Attendance	Presentation	10%			
			Individual Assignment	observation	20%			
			Group Assignment	assignment	20%			
			MID	Written test	25%			
			Final Exam	Written Test	25%			
				Total	100%			
Forms of media:	Boar	d, LCD Proje	ctor, Laptop/Com	puter				
	1			R. (1999). Curricu				
Literature	Development in Vocational and Technical Education (fifth edition). Massachusetts: Allyn and Bacon							
Literature:	2	•		ing the Curriculun				
				Collins Publishers				

	3. Bean, J.A., Toefr, C.F., & Alessi, S.J. (1986).
	Curriculum Planning and Development.
	Massachusetts: Allyn and Bacon
	4. Thompson, J.F. (1993). Foundation of Vocational
	Education. New Jersey: Prentice Hall
	5. Sukamto. (1988). Perencanaan & Pengembangan
	Kurikulum Pendidikan Teknologi dan Kejuruan.
	Jakarta: Dikti
	6. Sukamto. (2001). Perubahan Karakteristik Dunia Kerja
	dan Revitalisasi Pembelajaran dalam Kurikulum
	Pendidikan Kejuruan. Pidato Pengukuhan Guru Besar.
	Yogyakarta: UNY
	7. Ella Yulaelawati. (2004). Kurikulum dan Pembelajaran.
	Jakarta: Pakar Raya
	8. Pardjono, Wardan Suyanto, dan Satunggalno. (2003).
	Pendidikan Kejuruan dengan Kurikulum Berbasis
	Kompetensi Berorientasi Kecakapan Hidup. Makalah.
	Disampaikan dalam Lokakarya Pembelajaran dengan
	KBK Berorientasi Kecakapan Hidup tanggal 29 dan 30
	April 2003 di Fakultas Tekik Universitas Negeri
	Yogyakarta
	9. CD Bahan Sosialisasi Kurikulum Berbasis Kompetensi
	10. CD Sosialisasi Kurikulum Tingkat Satuan Pendidikan
	11. CD Sosialisasi Kurikulum 2013
	12. Handout
Date of revision	18 August 2018



#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Electrical Power Protection Lab. Work
Module level, if applicable:	Undergraduate
Code:	EKO6226
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	5 <sup>th</sup>
Module coordinator:	Dr. Edy Supriyadi
Lecturer(s):	1. Toto Sukisno, M.Pd.
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	200 minutes lectures and 240 minutes structured activities per week.
Teaching and Learning Method	Discussion
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.

Credit points:	2						
Prerequisites course(s):	-						
	After taking this course the students have ability to:						
			onstrate pic emic values,		•	loyalty to	
Expected Learning outcomes:		ELO3 Can carry out work in accordance with the professional field of expertise both individually and in teams					
	ELO4 Master in basic sciences and principles of electric						
	fie	eld o	•	ngineering b		raining in the ormation and	
	CO1		evoted to Goo itude and ch		nd able to sh	ow a regius	
	CO1.1	De	monstrate p	olite, honest	, good faith ir	n lectures.	
	CO2	CO2 Students actively participate, take respon and have the motivation to develop themselve				•	
Course outcomes:	CO3	pro			accordance ise both indiv		
	CO3.1		have accord	ling to acade	emic values,	norms and	
	CO4 Knowledge of law and the basic theory of electricity						
	CO4.1 Apply the basic laws of electricity to determine the value of the protection component					termine the	
			ELO1	ELO3	ELO4	ELO7	
	C01		<b>~</b>				
ELO and CO mapping	CO2			<b>~</b>			
	CO3				✓		
	CO4					✓	
Courses Description:	Electric Power Protection Lectures develop student competencies about the Protection Philosophy, which includes rational, understanding and protection functions, types of disturbances and their prevention, primary and reserve safety; Protection relays, including the understanding, functions and						

	requirements of relays, static and mechanical relays; Overcurrent Relays; understanding, working principle, type, configuration, usage; Distance relays, including, working principle, type, configuration, usage; Differential relays, including, working principle, type, configuration, usage; Voltage Relays, including, working principle, type, configuration, usage; Power Relays, including, working principle, type, configuration, usage; Direction Relay, including, working principle, type, configuration, usage; Power Breakers; Generator Protection, covering type of disturbance, protection devices, configuration & work system; Transformer Protection, covering type of disturbance, protection devices, configuration & work system; Transmission Network Protection, covering type of interference, protection devices, configuration & work system; Distribution Network Protection, covering type of interference, protection devices, configuration & work system; Distribution Network Protection, covering types of interference, protection, including the type of interference, protection devices, configuration & work systems; Motor protection, including the type of interference, protection devices approaches that are relevant to the context of the material and the potential of students, including: contextual, project based learning, and problem base learning that leads to student center learning. Continuous assessment is carried out on a competency basis and harmonized with lecture activities.				
Assessments:	The assessment is carried out to measure all learning outcomes, namely learning outcomes related to Attitudes, Knowledge, General Skills and Special Skills. Attitude assessment is carried out integrated in learning at each meeting using observation techniques. Basically every student has a good attitude. The student is given the value of a very good attitude or not good if it shows significantly better or less good attitude compared to the attitude of students in general. The results of the attitude assessment are not a component of the student's final grade, but rather as one of the graduation requirements. Students will graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness of students following lectures.The final mark will be weight as follow:				
	No	со	Assessment Object	Assessment Technique	Weight
	1	CO1 - CO4	Presence	Observation	10%
			Individual Assignment	Presentation	15%

		Group Assignment	Presentation	20%		
		Mid	Written test	25%		
		Final Exam	Written test	30%		
			Total	100%		
Forms of media:	Board, LCD P	Projector, Laptop/Compu	uter			
		1. Bonar Pandjaitan. 2012. Praktik-Praktik Proteksi Sistem Tenaga Listrik. Yogyakarta: Andi Offset.				
	<ol> <li>Christophe Prévé. 2006. Protection of Electrical Networks. London: ISTE,Ltd.</li> </ol>					
	<ol> <li>Edy Supriyadi, 2000. Sistem Proteksi Tenaga Listrik. Yogyakarta: Adi Cita.</li> </ol>					
Literature:	4. Elmore Walter A. <i>Protective Relaying Theory</i> & <i>Application</i> . New York: Marcell Dekker					
		ackburn & Thomas J. D <i>: Principles and Applica</i> .C.				
	6. PT. PLN (Persero) P3B. 2006. <i>Materi Pelatihan O&amp;M</i> <i>Relai Proteksi Jaringan</i> . Jakarta: PLN.					
	7. Russel M General I	lason. <i>The Art</i> & Scienc Electric	ce of Protective	Relaying.		
Date of revision	18 August 2018					



#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Vocational Instruction Strategic			
Module level, if applicable:	Undergraduate			
Code:	TKF6202			
Sub-heading,if applicable:	-			
Classes,if applicable:	-			
Semester:	5 <sup>th</sup>			
Module coordinator:	Dr. Haryanto, M.Pd., M.T			
Lecturer(s):	1. Dr. phil. Nurhening Yuniarti, M.T.			
Language:	Bahasa Indonesia			
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course			
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.			
Teaching and Learning Method	Discussion and Lecturing			
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.			
Credit points:	2			
Prerequisites course(s):	-			
Expected learning outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics</li> <li>ELO3 Can do work in accordance with professional expertise, both individually and in teams</li> </ul>			

	<ul> <li>ELO5 Mastering work standards, work methods, carrying out work, ar testing in the field of electric power engineering or industri automation.</li> <li>ELO6 Able to plan, implement, and evaluate learning in the field of electric power or automation techniques used</li> </ul>				or industrial		
	ELO9 Able to develop innovations in the field of education, and publish the results of his work					d publish the	
	CO1	Demonstrate p	olite, honest,	good faith ir	n lectures.		
	CO2	Demonstrates r independently.	esponsibility	for work in th	neir area of e	xpertise	
	CO3	work reports in	Knowledge of the preparation of scientific papers including work reports in accordance with scientific procedures based on data and information analysis.				
	CO3.1	Understand the	e scope of the	e Learning S	trategy Cour	se	
	CO3.2	Belief in the O Vocational Edu		argets, and I	_earning Pro	cess of	
	CO3.3	Understanding	Student-cen	tered learnin	g		
	CO3.4	Understand the	basic conce	epts of work-	based learnir	ng	
	CO3.5	Understanding Competency-based Learning					
Course Outcomes	CO3.6	Understanding Learning Theory					
	CO3.7	Understanding Pedagogy - Vocational Andragogy					
	CO3.8	Understanding	Process Sta	ndards			
	CO3.9	Learning approaches, methods and models					
	CO4	Apply education management to schools, education and training institutions in the field of Electrical Engineering					
	CO4.1	Using Learning Approaches, Methods, and Models					
	CO5	Apply logical, c the context of technology in a	developing o	r implement	ing science a	and / or	
	CO5.1	Developing Th Practices	eory Learni	ng Tools, P	ractices, an	d Field	
		ELO1	ELO3	ELO5	ELO6	ELO9	
	C01		LLUJ	LLOJ			
ELO and CO manning	CO2		✓				
ELO and CO mapping	CO3			✓		✓	
	CO4			✓			
	CO5			✓			
					<u> </u>	<u> </u>	

Courses Description:	underg the Vo experi vocation strateg accord the go andrag learnir learnir tools, educa learn throug	Vocational Learning Strategy courses are programmed for all undergraduate study program students at FT UNY. The implementation of the Vocational Learning Strategy course is intended to provide learning experiences to students as prospective teachers / instructors of vocational / vocational education and training in order to be able to develop teaching strategies for creative, structured, measurable, and reasonable education according to vocational education and training needs. This course discusses the goals and objectives of vocational learning, vocational pedagogy and andragogy, learning theory, work-based learning, competency-based learning, student-centered contextual learning, cooperative learning, learning methods and models, learning tools in the industry, and educational process standards. In the learning process students are able to learn independently by using various learning and multimedia resources through the internet network.				
Assessments:	att sk 2. At teo ev go att bu frc als 3. Fii sk as Se	ainment le ills. titude asse chniques a ery studen od attitude attitude com e attitude a trather as om this cou so conside nal grades ills, and s signments emester Ex	essment is carried out to measure essment is carried out at nd / or self-assessment us thas a good attitude. The e or not good if it shows pared to the attitude of st ssessment are not a comp one of the graduation req urse if at least have a go rs the activeness of stude include the results of an a pecial skills obtained from , presentations, quizzes tams with the following gu	each meeting using sing the assumption the student is given a va significantly better of sudents in general. The conent of the student's uirements. Students wood attitude. Attitude nots following lectures ssessment of knowled m individual assignments, Insertion Exams, idelines.	and special observation nat basically lue of a very or less good ne results of s final grade, will graduate assessment dge, general ents, group	
	No	СО	Assessment Object	Assessment Technique	Weight	
	1	CO2 CO3	Presentation	Presentation	10%	
		CO4 CO5	Individual Assignment	Accuracy of program results	10%	
			Group Assignment	Written test	10%	
			Quiz	Written test	20%	
			MID	Written test	20%	
			Final Exam	Written test	30%	
				Total	100%	

Forms of media:	Board, LCD Projector, Laptop/Computer
	1. Billet, S. (2011). Vocational Education Purposes, Traditions and Prospects. New York: Springer Science+Business Media B.V.
	2. Blank, W.E. (1982). <i>Handbook for Developing Competency-Based Training Programs</i> . London : Prentice-Hall,Inc.
	3. Cuningham, I., Dawe, G., Bennett, B. (2004) <i>The Handbook of Work Based Learning.</i> Burlington: Gower Publishing Company.
	4. Hill, W.F. (2011). <i>Teori-teori Pembelajaran: Konsepsi, komparasi, dan Signifikasni</i> . Bandung: Nusamedia
	5. Jonassen D.H. (2004). <i>Learning to Solve Problems an Instructional Desig Guide</i> . San Francisco: Pfeiffer.
	<ol> <li>Jonassen D.H. (2004). Learning to Solve Problems a Handbook for Desinging Problem-Solving Learning Environments. San Francisco: Pfeiffer.</li> </ol>
	<ol> <li>Koper, R. &amp; Tatterasal, C. (2005). Learning Design A Handbooks on Modelling and Delivering Networked Education Training. New York: Springer.</li> </ol>
	8. Leighbody, G.B. (1966). <i>Methods of teaching shops and technocal subjects</i> . New York: Delmar Publisher.
Literature:	<ol> <li>Lucas.B., Spencer.,E., Claxton.G. 2012. How To Teach Vocational Education, A Theory Of Vocational Pedagogy. London: Centre for Skills Development</li> </ol>
	10. Maclean, R. (2007). <i>Learning and Teaching for the Twenty-First</i> <i>Century.</i> New York: Springer
	11. Tan, O.S. (2003) Problem-Based Learning, Innovation Using Problems to Power Learning in the 21st Century: Singapore: Cengage Learning
	<ol> <li>Anderson, Lorin W. (1989). The effective teacher: Studi guide and readings. New York: McGraw-Hill Publishing Co.</li> <li>Atwi Suparman (2001). Disain instructional. Jakarta: PAU Depdiknas.</li> </ol>
	<ol> <li>Harris, R., Guthrie, H., Hobart, B. (1995). Competency based education and training. MacMillan Education Australia Ltd.</li> <li>Mills, H.R. (1977). Teaching and training: A handbook for instructors.</li> </ol>
	London: The MacMillan Press, Ltd. 16. Klein, Stephen B. (2002). <i>Learning: Principles and application</i> . New
	York: McGraww-Hill Publishing Company. 17. Cheng, Y.C. (2005). New Paradigm For Re-Engineering Education,
	Globalization, Localization and Individualization. Dordrecht: Springer 18. Pavlova, M. (2009). Technology and Vocational Education for Subtringible Development Empowering Individuals for the Euture
	Sustainable Development Empowering Individuals for the Future. Queensland: Springer Science Business Media B.V. 19. Piirto, J. (2011). Creativity for 21st Century Skills How To Embed
	<ul> <li>Creativity Into The Curriculum. Rotterdam: Sense Publishers</li> <li>20. Staron, M. 2011. Life-Based Learning Model – A Model For Strengt- Based Approaches To Capability Development and Implications for Personal Development Planning. Australian Government Department</li> </ul>
	for Education Science and Training and TAFE NSW Available on-line

	<ul> <li>at:http://learningtobeprofessional.pbworks.com/w/page/32893040/Lifebased-learning Accessed 21/12/2014</li> <li>21. Staron, M., Jasinski, M and Weatherley, R. 2006. Life-Based Learning: A Strength-Based Approach For Capability Development In Vocational And Technical Education. Australian Government Department for Education Science and Training and TAFE NSW Available on-line at:http://learningtobeprofessional.pbworks.com/w/page/32893040/Lifebased-learning Accessed 21/12/2014</li> <li>22. Wardiman Djojonegoro. (1998). Pengembangan Sumberdaya Manusia melalui SMK. Jakarta : PT. Jayakarta Agung Offset.</li> </ul>
Date of revision	30 August 2018



#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Vocational Learning Assessment
Module level, if applicable:	Undergraduate
Code:	KFT6204
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	5 <sup>th</sup>
Module coordinator:	Dr. Edy Supriyadi, M.Pd.
Lecturer(s):	<ol> <li>Dr. Haryanto, M.Pd. M.T.</li> <li>Prof. Dr. Samsul Hadi, M.Pd., M.T.</li> </ol>
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Discussion and Lecturing.
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.

Credit points:	2
Prerequisites course(s):	-
	After taking this course the students have ability to:
	ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics
	ELO2 Contribute to improving the quality of community, nation, and state life the progress of civilization based on Pancasila.
	ELO3 Demonstrates responsibility for work in their area of expertise independently.
Expected learning	ELO5 Knowledge of the preparation of scientific works including work reports in accordance with scientific procedures based on data analysis and information related to learning assessment.
outcomes:	ELO6 Apply information and communication technology in carrying out the duties of educators and education personnel.
	ELO8 Implement strategies, media, teaching materials, and evaluation of learning in technology and vocational education in the field of Electrical Engineering.
	ELO9 Assessing the implications of the development or implementation of science, technology or art in accordance with their expertise based on the rules, procedures and scientific ethics to produce solutions, ideas, designs, or art criticism and compile scientific descriptions of the results of their studies in the form of thesis or final project report.
	CO1 Devoted to God YME and able to show a religious attitude and character
	CO2 Uphold the confidentiality of his work, honest and fair in carrying out duties based on religion, morals, and ethics.
Course Outcomes:	CO3 Show a professional attitude in carrying out their duties with full responsibility and high dedication.
	CO4 Knowledge of the preparation of scientific works including work reports in accordance with scientific procedures based on data and information analysis.
	CO5 Preparation of work reports qualitatively and quantitatively in accordance with scientific procedures based on data analysis and information related to learning

	assessment.							
	CO6 Use information and communication technology compile, process / analyze data and information measurement results and in making reports related learning evaluation and assessment tasks.						ation on	
	CO6.1	learning by developing test and non-test instrument and analyzing data and information on measurement results, then interpreting the results as outlined in the report of learning outcomes.						ruments urement
	C07	Implement strategies, media, teaching materials, and evaluation of learning in technology and vocational education in the field of Electrical Engineering.						cational
	CO8	Applying assessment skills to learning technology and vocational education in the field of Electrical Engineering both theory and practice through the use of IT and various measurement techniques using test and non-test instruments that have been developed.						the use sing test
	CO9	Provide assessment technique skills for learning technology and vocational education in the field of Electrical Engineering both theory and practice through the use of IT to produce ideas for evaluation and assessment that are solutive, effective and efficient.						
· · · · · · · · · · · · · · · · · · ·								
		ELO1	ELO2	ELO3	ELO5	ELO6	ELO8	ELO9
	CO1	ELO1	ELO2	ELO3	ELO5	ELO6	ELO8	ELO9
	CO1 CO2		ELO2	ELO3	ELO5	ELO6	ELO8	ELO9
				ELO3	ELO5	ELO6	ELO8	ELO9
ELO and CO mapping	CO2			ELO3	ELO5	ELO6	ELO8	ELO9
ELO and CO mapping	CO2 CO3			ELO3		ELO6	ELO8	ELO9
ELO and CO mapping	CO2 CO3 CO4			ELO3	×	ELO6	ELO8	ELO9
ELO and CO mapping	CO2 CO3 CO4 CO5			ELO3	×		EL08	ELO9
ELO and CO mapping	CO2 CO3 CO4 CO5 CO6			ELO3	×			ELO9

Courses Description:	to ap devel test it tests,	This course develops student competencies in order to be able to apply evaluation and assessment of learning outcomes, develop test and non-test instruments, analyze test and non- test items, describe the results of analysis of test items and non- tests, and make evaluation and assessment reports of student learning outcomes.						
Assessments:	achie 2, 3), (CO & 2. Att obser assur The s if it sh the a asses but r Stude attitud stude 3. Fi know individ quizz	<ol> <li>Assessment is carried out to measure all learning achievements, namely attitudes learning achievements (CO 1 2, 3), knowledge (CO 5), and special skills (CO 6), general skills (CO 8, 9).</li> <li>Attitude assessment is carried out at each meeting using observation techniques and / or peer assessment by using the assumption that basically every student has a good attitude The student is given a value of a very good attitude or not good if it shows significantly better or less good attitude compared to the attitude of students in general. The results of attitude assessment are not a component of the student's final grade but rather as one of the graduation requirements (10%) Students will graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness or students following lectures.</li> <li>Final grades include the results of the assessment or knowledge, special skills and general skills, obtained from individual assignments, group assignments, presentations quizzes, Midterm Exams, and Final Semester Exams with the following guidelines.</li> </ol>						
	No	со	Assessment Object	Assessment Technique	Weight			
	1	CO1	Presentation	Observation	10%			
		CO2 CO3	individual Assignment	Presentation	20%			
		CO5 CO6	Group Assignment	Presentation	20%			
		CO8	quiz	Written test	20%			
		CO9	MID	Written test				
				1	20%			
			Final Exam	Written test	20% 30			

Forms of media:	Board, LCD Projector, Laptop/Computer
	1. Cohen-Swerdlik (2009). Psychological Testing and Assessment: An Introduction to Tests and Measurement 7th Edition. USA: Mc. Graw Hill Company.
	<ol> <li>Groth, G. &amp; Marnat. (2003). Handbook of psychological assessment fourth edition. Canada: John Wiley &amp; Sons, Inc.</li> </ol>
	3. Higher Education Commission. (2012). <i>Classroom</i> <i>Assessment</i> . USA: Columbia University Press
	4. Lester, P.E., Inman, D., & Bishop, L. 2014. Handbook of tests and measurement in education and the social sciences third edition. USA: The Rowman & Littlefield Publishing Group, Inc.
Literature:	5. Phye, G.D. (1997). Handbook of classroom assessment learning, achievement, and adjustment. USA: Academic Press.
	<ol> <li>Scheerens, J., Glas, C., &amp; Thomas, S.M., 2003. Educational evaluation, assessment, and monitoring. Netherland: Swets &amp; Zeitlinger B.V., Lisse, The Netherlands.</li> </ol>
	<ol> <li>Timothy R. Vansickle, T.R. &amp; Vansickle, K.J. (1988).</li> <li>Vocational assessment handbook. Texas: Texas University Press.</li> </ol>
	<ol> <li>van den Åkker, J., Gravemeijer, K., Susan McKenney, S., &amp; Nienke Nieveen, N. (2006). Educational Design Research The Design, Development and Evaluation of Programs, Processes and Products. Canada: Taylor &amp; Francis.</li> </ol>
Date of revision	28 August 2018



# Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Industrial Internship
Module level,if applicable:	Undergraduate
Code:	KTF6309
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	5 <sup>th</sup>
Module coordinator:	Moh. Khairudin, M.T.,Ph.D.
Lecturer(s):	<ol> <li>Bambang sulistyo,S.Pd.,M.Eng.</li> <li>Mohamad Ali,MT</li> <li>Muslikhin,M.Pd.</li> <li>Yosep efendi, M.Pd.</li> <li>Arif Marwanto,M.Pd.</li> <li>Didik Purwantoro,M.Eng.</li> <li>Moh. Adem Yerusalem, Ph.D.</li> <li>Dewi Eka Murniati, S.E.,M.M.</li> </ol>
	9. Dra. Yuswati,M.P.d. 10. Dra. Sari Puspita 11. Joko Santosa
Language:	Bahasa Indonesia

Classification within the curriculum:	Compulsory/ <del>Elective</del> Course						
Teaching format / class hours per week during the semester:	300 m week.	300 minutes lectures and 360 minutes structured activities per week.					
Teaching and Learning Method:	Discus	Discussion, Demonstration, and Lecturing					
Workload:	minute	vorkload is 272 hours per semester which consists of 300 is lectures, 360 minutes structured activities, and 360 minutes udy per week for 16 weeks.					
Credit points:	3						
Prerequisites course(s):	-						
	After ta	aking this course the students have ability to:					
	ELO1	Demonstrate piousness to God, high loyalty to academic values, norms, and ethics					
	ELO2	Demonstrate nationalism, responsibility, and tolerance to both society and environmet					
	ELO3	Capable to perform professional works in his/her field of expertise both individual and team works					
	ELO4 Master in basic sciences and principles of electric						
Expected Learning Outcomes:	ELO5	Master in work standards, work methods, work implementations, and testing in electric power or industrial automation expertise.					
	ELO6	Capable to make plans, implement, and evaluate learning in electric power or industrial automation expertise					
	ELO7	Capable to manage vocational education and training of electrical engineering expertise by utilizing information and communications technology					
	ELO8	Capable to apply research and scientific writing methods					
	ELO9	Capable to develop a vocational education innovation and publish scientific paper					
	CO1	Devotion to God Almighty, devout worship and noble deeds.					
Course outcomes:	CO2	Students agree to be active, responsible, and have the motivation to develop themselves,					
	CO3	So students can add insight into knowledge and technology Through Activities Direct experience in the industry / company / workshop occupied. In addition,					

	students can learn aspects of entrepreneurship related to the industry occupied, so that it can bring experience practice industry into his duties after graduation.									
	CO4	CO4 Explain industrial management and required labor competencies industry, according to the industry / company / workshop occupied.								
	CO5	CO5 Help carry out the tasks and activities of the production process and / or process services in the industry / company / workshop occupied.								
	CO6 Find a case when implementing Industry Practices and analyze it in depth as outlined in the Industry Practice report. If possible, the case can be appointed as a Final Project and or Thesis.							actice		
	CO7 Having entrepreneurial competence as indicated by making proposals establishing a business (specifically for PI entrepreneur participants). Even if allows, a study of proposals to establish a business can be raised become the Final Project and or Thesis.							Illy for Idy of		
		ELO1	ELO2	ELO3	ELO4	ELO5	ELO6	EL07	ELO8	ELO9
	C01	*								
	CO2		*							
ELO and CO mapping:	СОЗ			*	*	*	*	*	*	~
	CO4			~	*	*	*	~	*	~
	CO5			*	*	*	*	*	*	~
	CO6			~	*	*	*	~	*	~
	C07			•	*	•	*	*	*	•
Courses Description:	contin is a cu Impler block	ues to urricula nentat syster	run pe ar prog ion of n in c	erfected gram w at leas odd sen	. With a hich mi at 256 h nester,	a credit ust be f nours o even s	weight aken b r for 2 semeste	of 3 SK by FT L (two) r er spec	S, this JNY stu nonths cial ser	vhich it activity udents. with a mester. hat are

	Meet the requirements and relevant to existing study programs at FT UNY. Therefore in searching, selecting and selecting students for Industrial Practices well organized through planning, coordination, implementation, control and careful evaluation, so as to achieve effective and efficient goals. In order to support the smooth running of the Industrial Practice program, governance is needed Administrative arrangements and administration are regulated in the industry practice manual.						
	name		is carried out to measur es learning achievemen skills.				
	obser assum stude signifi stude comp gradu cours consid 3. Fin	vation ten nption that nt is giver cantly be nts in ge onent of lation req e if at lea ders the a	sessment is carried or chniques and / or peer at basically every studer in a value of a very good a tter or less good attitude neral. The results of atti the student's final grade juirements (10%). Stude ast have a good attitude activeness of students foll is include the results of the	assessment by thas a good att ttitude or not good compared to the tude assessment e, but rather as ents will graduate e. Attitude assess owing lectures.	using the titude. The d if it shows attitude of attitude of are not a one of the from this sment also		
Study/exam achievements:	assigi	nments, g	and general skills, group assignments, pres nal Semester Exams with	obtained from entations, quizzes	individual s, Midterm		
-	assigi	nments, g	and general skills, group assignments, pres	obtained from entations, quizzes	individual s, Midterm		
-	assigi Exam	nments, g s, and Fir	and general skills, group assignments, pres nal Semester Exams with	obtained from entations, quizzes the following guid Assessment Technique Observation/	individual s, Midterm delines.		
-	assigi Exam	nments, g is, and Fir CO	and general skills, group assignments, pres nal Semester Exams with Assessment Object Industrial Valuation f. Work discipline	obtained from entations, quizzed the following guid Assessment Technique	individual s, Midterm delines. Weight		
-	assigi Exam	nments, g is, and Fir <b>CO</b> CO1	and general skills, group assignments, pres nal Semester Exams with Assessment Object Industrial Valuation f. Work discipline g. Work attitude	obtained from entations, quizzes the following guid Assessment Technique Observation/	individual s, Midterm delines. Weight 15%		
-	assigi Exam	nments, g is, and Fir <b>CO</b> CO1	and general skills, group assignments, pres nal Semester Exams with Assessment Object Industrial Valuation f. Work discipline	obtained from entations, quizzes the following guid Assessment Technique Observation/	individual s, Midterm delines. Weight 15% 15%		
-	assigi Exam	nments, g is, and Fir <b>CO</b> CO1	and general skills, group assignments, pres nal Semester Exams with Assessment Object Industrial Valuation f. Work discipline g. Work attitude h. Creativity	obtained from entations, quizzes the following guid Assessment Technique Observation/	individual s, Midterm delines. Weight 15% 15% 15%		
-	assigi Exam	nments, g is, and Fir <b>CO</b> CO1	and general skills, group assignments, pres hal Semester Exams with Assessment Object Industrial Valuation f. Work discipline g. Work attitude h. Creativity i. Work quality	obtained from entations, quizzes the following guid Assessment Technique Observation/ Documentation	individual s, Midterm delines. Weight 15% 15% 15%		
-	Assign Exam	nments, g is, and Fir CO1 -CO7	and general skills, group assignments, pres hal Semester Exams with Assessment Object Industrial Valuation f. Work discipline g. Work attitude h. Creativity i. Work quality	obtained from entations, quizzes the following guid Assessment Technique Observation/ Documentation Written test Total	individual s, Midterm delines. Weight 15% 15% 15% 40%		
achievements:	Assign Exam	nments, g is, and Fir CO1 -CO7 d, LCD Pro	and general skills, group assignments, pres nal Semester Exams with Assessment Object Industrial Valuation f. Work discipline g. Work attitude h. Creativity i. Work quality Faculty assessment	obtained from entations, quizzes the following guid Assessment Technique Observation/ Documentation Written test Total	individual s, Midterm delines. <b>Weight</b> 15% 15% 15% 40% 100%		



# Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Education Multimedia Design Lab. Work
Module level, if applicable:	Undergraduate
Code:	EKO6336
Sub-heading, if applicable:	-
Classes, if applicable:	-
Semester:	5 <sup>th</sup>
Module coordinator:	Dr, Sunaryo Soenarto, M.Pd.
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	200 minutes lectures and 240 minutes structured activities per week.
Teaching and Learning Method	Demonstration, Simulation.
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-
Expected learning outcomes:	After taking this course the students have ability to:

		Demonstrate piousness to God, high loyalty to cademic values, norms, and ethics
		an carry out work in accordance with the professional eld of expertise both individually and in teams
	ir	Mastering work standards, work methods, work nplementation, and testing in the field of electric power ngineering or industrial automation.
		Able to plan, implement, and evaluate learning in the ield of electric power or automation
	fi	ble to manage vocational education and training in the ield of Electrical Engineering by utilizing information and communication technology
Course Outcomes	CO1	Explain the concepts and characteristics of interactive learning multimedia
	CO2	Internalize academic values, norms and ethics
	CO3	Demonstrates responsibility for work in their area of expertise independently.
	CO4	Knowledge of the preparation of scientific works including work reports in accordance with scientific procedures based on data and information analysis.
	CO4.1	Explain the description of this course in general, the concept of multimedia and learning media. Development of learning multimedia as the final project of the course.
	CO5	Apply information and communication technology in carrying out the duties of educators and education personnel
	CO5.1	Students can understand and be able to apply the stages of analysis after finding the object of a class in a particular school.
	CO5.2	Operate an application program to design animations
	CO5.3	Producing Interactive MP courses / subjects taught
	CO5.4	Prepare skills for image editing, audio editing, video editing.
	CO5.5	Make progress reports and presentations
	CO5.6	Fundamentals of animation techniques.

	CO5.7	Advanc	ed anima	ation tech	niques			
	CO5.8 Stages of evaluation, implementation and functionality testing of the work of students about multimedia learning							
	<ul> <li>CO6 Implement new technology to design, analyze and apply measurement systems related to the Quantity and Quality of Electric Power Engineering or Industrial Automation to meet the needs of the community in a professional and ethical manner</li> <li>CO6.1 Introduction to Augmented Reality and Virtual Reality technologies for learning media.</li> </ul>							
ELO and CO mapping		ELO1	ELO3	ELO5	ELO6	ELO7		
	CO1	~						
	CO2		✓					
	CO3			✓	✓	✓		
	CO4			✓	✓	✓		
	CO5			✓	✓	✓		
	CO6			✓	✓	✓		
Courses Description:	/ or dever practical the bas multimed Instruction Develop analysis analysis Followed develop testing	elopment course dia-based onal Des ment, In emphas activities d by the ment and the learn	of the Me (2 credits epts and d learr ign) with nplement size the s in the e design d implen ning med	edia Educ ), in prin- impleme ing de the app ation ar need a scope o of instr nentation lia. Intro	ation (Th ciple this entation esign ( roach of nd Evalu ssessme f learning ructional stages ducing th	eory) cou course c of the s (Multimec Analysis ation. S ation. S nt and g in a cla media, and end	ation and irse. As a liscusses tages of lia-based , Design, tages of front-end assroom. then the ling with learning ality.	
Assessments	achi (CO	evement 1), gen	s, namely	y attainm s (CO 2)	ent learn ), knowle	ing achie	learning evements 3), and	

2. Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if it shows significantly better or less good attitude compared to the attitude of students in general. The results of the attitude assessment are not a component of the student's final grade, but rather as one of the graduation requirements. Students will graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness of students following lectures.

3. Final grades include the results of the assessment of knowledge, general skills, and special skills obtained from individual assignments, group assignments, presentations, quizzes, insert tests, and final semester examinations with the following guidelines:

No	СО	Assessment Object	Assessment Technique	Weight
1	CO1- CO6	Attitude	a. Active in class b. assignment c. Discussion d. Presentation	15%
		Knowledge	a. Quiz b. Assignment c. MID d. Final exams e. Presentation	50%
		Skills	<ul> <li>a. Image, audio, video editing</li> <li>b. Animation programming</li> <li>c. Script programming</li> <li>d. Discussion</li> <li>e. Presentation</li> </ul>	40%
	<u> </u>	1	Total	100%

Forms of media:	Board, LCD Projector, Laptop/Computer
Literature:	1. Renee R. & Julie R. 2014. <i>Digital Thinking and Mobile Teaching</i> . Bookboon.com
	2. Robert M. Branch (2009). <i>Instructional Design: The ADDIE Approach</i> . Springer New York.
	3. Stephen M.Alessi & Stanley R.T. (2001). <i>Multimedia for</i> <i>Learning Methods and Development 3<sup>rd</sup> Edition</i> . Allyn and
	<ul><li>Bacon, A Pearson Education Company</li><li>4. Stephen Weinstein. 2005. <i>The Multimedia internet</i>. Springer.</li></ul>
	5. William Lee (2002). <i>Multimedia-Based Instructional Desain</i> . Prentice-Hall Company.
Date of revision	18 August 2018



# Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Transmission and Distribution
Module level, if applicable:	Undergraduate
Code:	EKO6237
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	5 <sup>th</sup>
Module coordinator:	Dr. Giri Wiyono, M.T
Lecturer(s):	1. Dr. Zamtinah
	2. Faranita Surwi, M.T.
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Discussion
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-

	After takir	ng this course the students have ability to:
		emonstrate piousness to God, high loyalty to ademic values, norms, and ethics
Expected Learning	ELO4 Ma	astering basic science and basic electricity
outcomes:	im	astering work standards, work methods, work plementation, and testing in the field of electric power gineering or industrial automation.
		ble to plan, implement, and evaluate learning in the ld of electric power or automation
	CO1	Devoted to God Almighty and able to show a religious attitude and character.
	CO2	Knowledge of law and the basic theory of electricity.
	C02.1	Understanding modeling of single line diagrams and impedance diagrams.
	CO2.2	Calculate the parameters of the electric power transmission line.
	CO2.3	Analyzing the relationship of current and voltage on the electric power transmission line
	CO2.4	Analyzing the construction of high voltage transmission air ducts
Course outcomes:	CO2.5	Understand the characteristics and design of power distribution channels
	CO2.6	Understanding the characteristics of air ducts and underground cables in the power distribution channel
	CO2.7	Understanding the characteristics of electrical loads.
	CO2.8	Understand the application of electric power distribution transformers.
	CO2.9	Calculates voltage drop and power loss.
	CO2.10	Understand the application of capacitors in power distribution channels.

					-		
			ELO1	ELO4	ELO5	ELO6	
ELO and CO mapping	С	01	$\checkmark$				
	С	02		✓	✓	✓	
Courses Description:	Powe Mode Electr Trans Powe Const Electr ducts Chan electr powe	r Transı I single ic Pow mission r Transı rruction ic Powe and un nels, C ic powe r loss c	mission and line diagra ver Systen Lines, Curr mission Line High Volta er Distribut derground haracteristio er distributi	d Distribution ms and imp n, Paramet rent and Volt es, Analysis age, Charac ion Channe cables on E cs of electr on transforr Application	System wh edance diag ers of Ele- age Relation of Air Line T cteristics and ls, Characte lectric Power ic loads, Ap ners, Voltag	s on Electric Transmission d design of ristics of air	
	achie	d CO2),		ttainment lea		all learning ements (CO special skills	
Assesments:	the m assur The s attitud asses final g Stude have	ethod c nption tl tudent de if the de comp ssment r grade, b ents are a good	of observation nat basically is given a student sh ared to the esults are r ut rather as declared to attitude. At	on and / or y every stud rating of a v sows signific student's at not a major one of the graduate fr titude asses	sment also c	ent with the bod attitude. unfavorable or less good eral. Attitude f a student's equirements. se if at least	
	activeness of students in attending lectures. 2. Final scores include the results of the assessment of attitudes, knowledge, skills obtained from individual assignments, group assignments, presentations, tests (quizzes), Midterm Exams (UTS), and Final Semester Exams (UAS)						
	i ne fi	nai mari	ew eq IIIw	ight as follov	ν.		
	No	СО	Assessm	ent Object	Assessmen Technique	•	
	1	CO1 -	Presence		Observation	10%	

	CO2	Individual Assignment	Presentation	10%
		Group Assignment	Presentation	10%
		Quiz	Written test	15%
		Mid	Written test	25%
		Final Exam	Written test	30%
		-	Total	100%
Forms of media:	Board, LCD F	Projector, Laptop/Comp	uter	
Literature:	<ul> <li>Fundamen</li> <li>2. Gonen, Tu Engineerin</li> <li>Sons.</li> <li>3. Gonen, Tu Engineerin</li> <li>4. Pabla, AS Erlangga.</li> <li>5. Saadat, H Graw-Hill.</li> <li>6. Williem, S</li> </ul>	mes J. 1994. Power Dis ntals and Applications. N uran. 1988. Electric Poung: Analysis and Design uran. 2014. Electric Pow ng Third Edition. New Yo 5. 1981. Sistem Distrib adi. 1999. Power System tevenson. 1997. Electric e: Mc Graw-Hill.	New York: Marce wer Transmissic Singapore: Joh ver Distribution ork: CRC Press. usi Daya Listrik m Analysis. Bos	el Dekker. on System on Wiley & a. Jakarta: ton: Mc
Date of revision	11 August 20			



# Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Electrical Maintenance and Services Lab. Work
Module level, if applicable:	Undergraduate
Code:	EKO6238
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	5 <sup>th</sup>
Module coordinator:	Toto Sukisno, S.Pd.,M.Eng
Lecturer(s):	1. Totok Heru Tri Maryadi,M. Pd.
	2. Eko Swi Darmawan, M. Pd.
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week.
Teaching and Learning Method	Discussion, Observation,
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-

Expected Learning	After tak	king this course the students have ability to:
Outcomes:		Demonstrate piousness to God, high loyalty to academic values, norms, and ethics
		Can carry out work in accordance with the professional field of expertise both individually and in teams
	ELO4	Master in basic sciences and principles of electric
	ELO7	Able to manage vocational education and training in the field of Electrical Engineering by utilizing information and communication technology
Course Outcomes:	CO1	Devoted to God and able to show a religious attitude and character.
	CO2	Demonstrates responsibility for work in their area of expertise independently.
	CO3	Knowledge of law and the basic theory of electricity.
	CO3.1	Identifying the components of the electric power system
	CO4	Knowledge of the preparation of scientific works including work reports in accordance with scientific procedures based on data and information analysis.
	CO4.1	Explain the standard of testing the insulation resistance of electric power system components
	CO4.2	Explain the preparation of practice reports in accordance with scientific procedures
	CO4.3	Explain the preparation of reports and recommendations for inspection and testing work in the electric power system
	CO5	Apply the theory of measurement and measurement of electrical parameters.
	C05.1	Measure and test insulation resistance on synchronous generators
	CO5.2	Measure and test insulation resistance in power installations
	CO5.3	Measure and test insulation resistance in lighting installations

	CO5.4	Measure and	tost the incul	ation register	<u></u>
	000.4	power transfo			
	CO5.5	Measure and suppliers	test groundin	g resistance	for lightning
	CO5.6	Measure and induction mote		n resistance o	on 1 phase
	CO6	Apply mainter power system			
	CO6.1	Conduct rewir rewinding	nding 1 phase	e induction m	otor
	CO6.2	Conduct rewir rewinding	nding 3-phase	e induction m	otor
ELO and CO mapping:					
		ELO1	ELO3	ELO4	ELO7
	CO1	~			
	CO2	×			
	CO3		<b>~</b>	×	
	CO4			✓	✓
	CO5			✓	✓
	CO6			<b>~</b>	<b>~</b>
Courses Description:	repair of in the ger scope of on powe checks a power ins systems, electric n	rse discusses electrical systen nerating sub-sy this course ma r plants, chec nd tests on ligh stallations, che rewinding 1 ph notors, and pre sults of inspect	ems ranging restem to the uniterial include ks and tests noting installate recks and test hase electric reparing repo	from existing utilization sub- es: examinations on power to ions, checks is on lightning motors, rewin rts and record	components -system. The ons and tests ransformers, and tests on g distribution ding 3 phase

Assessments:	achie	evements	is carried out to , namely attainment nd special skills.	measure all learning achi	0						
	the n assu The attitu attitu asse final Stude have	nethod o mption th student i de if the de comp ssment re grade, bu ents are a good a	sessment is carried out f observation and / or nat basically every stu- s given a rating of a student shows signific ared to the student's a esults are not a major ut rather as one of the declared to graduate f attitude. Attitude asses students in attending le	self-assessmen dent has a goo very good or u cantly better or ttitude in genera component of a graduation req rom this course ssment also cor	nt with the d attitude. nfavorable less good al. Attitude a student's uirements. if at least						
	attitu assig (quiz (UAS	des, kr inments, zes), Mic S)	0,	tained from s, presentation nd Final Semes	individual ns, tests						
	No	со	Assessment Object	Assessment Technique	Weight						
	1	CO1 -	Quiz	knowladge	10%						
		00	0.06	CO6	000	000			Discussion rubric	Knowledge and attitude	10%
				Observation	active	10%					
			Assessment of practice	skills	50%						
			practice report	knowladge	15%						
				Total	100%						
Forms of media:	Boar	d, LCD P	rojector, Laptop/Comp	uter							
Literature:	1. 2. 3.	Perbaika Theraja, Electrica Chand.	15). Panduan Praktik F an Kelistrikan. Tidak Dir B. L., & Theraja, A. K. Il Technology Volume I o, M. A. (1993). Motor I	terbitkan. (2017). Textboo IN SI System o	ok of f Units. S.						
			rtama, Penerbit Andi O								



# Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Professional Ethics
Module level, if applicable:	Undergraduate
Code:	EKO6254
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	5 <sup>th</sup>
Module coordinator:	Dr. phil. Nurhening Yuniarti, M.T.
Lecturer(s):	Dr. Istanto Wahyu Djatmiko, M.Pd. Dr. Edy Supriyadi, M.Pd. Dr. Drs. Haryanto, M.Pd.,M.T.
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/Elective Course
Teaching format / class hours per week during the semester:	The form of learning is in the form of lectures, which consist of 100 minutes of face-to-face activities per week per semester; (2) structured assignment activities 120 minutes per week per semester; and (3) 120 minutes of independent activities per week per semester.
Teaching and Learning Method	Demonstration, Simulation, and Discussion
Workload:	Total workload is 26 hours 40 minutes of face-to-face activities per semester
Credit points:	2
Prerequisites course(s):	-
Expected learning outcomes:	After taking this course the students have ability to:

ELO1		onstrate pio	usness to	God. hiah	loyalty to	
	acade	emic values,	norms, and e		loyuny to	
ELO3						
ELO4	imple	mentation, ar	nd testing in t	he field of ele		
ELO6	field o	of Electrical	Engineering	by utilizing		
CO1		• •	disciplined,	and hones	t attitude	
CO2					nal Ethics	
CO3					thics and	
CO4	CO4 Able to apply the concept of professional ethics and code of ethics in carrying out duties as a professional teacher in the field of electrical engineering education				ofessional	
CO5	<b>o i i</b>					
CO6 Being able to analyze the importance of Intellectual						
Property Rights (IPR) for the teaching profession.						
		ELO1	ELO3	ELO4	ELO6	
С	01	✓				
С	02		✓			
С	<b>O</b> 3		✓	✓		
С	04			✓		
С	O5				✓	
С	06				✓	
ethical profess various the tea implem technic out us	beha sion in s spect iching p nentatio cal voo ing the	vior in car the field of rums of thougorofession, e on and dev ational teach student cer	rying out the electrical en ght in ethics, thical issues velopment in ner professio	he vocation gineering wh description o in the profess n the praction. Lectures approach with	al teacher nich covers f ethics and sion, and its ice of the are carried ith problem	
	ELO4 ELO6 CO1 CO2 CO3 CO4 CO5 CO6 CO6 CO6 CO6 CO6 CO6 CO6 CO6 CO6 CO6	ELO4 Masterimpler engin ELO6 Able to field of and c CO1 Show durin CO2 Can cours CO3 Mast profe CO4 Able code teach CO5 Being profe CO6 Being Prop	field of expertise b         ELO4       Mastering work implementation, arengineering or ind         ELO6       Able to manage vo field of Electrical and communicatio         CO1       Showing polite, during lectures.         CO2       Can carry out the course both indep         CO3       Mastering the corprofessional code         CO4       Able to apply the code of ethics in orteacher in the field         CO5       Being able to are professional ethic         CO6       Being able to are profession in the field of various spectrums of thoughts (I         CO5       CO6         Providing knowledge ab ethical behavior in care profession in the field of various spectrums of thought the teaching profession, ethical vocational teach out using the student cereix	field of expertise both individua         ELO4       Mastering work standards, implementation, and testing in the engineering or industrial autom         ELO6       Able to manage vocational eduction field of Electrical Engineering and communication technology         CO1       Showing polite, disciplined, during lectures.         CO2       Can carry out the tasks of the course both independently and course both independently and course both independently and code of ethics in carrying out deteacher in the field of electrical for the code of ethics in carrying out deteacher in the field of electrical for the code of ethics.         CO3       Being able to analyze antiprofessional ethics.         CO6       Being able to analyze the improfessional ethics.         CO6       Being able to analyze the improfessional ethics.         CO6       Co1         CO5       Co1         CO4       Co2         CO3       Co4         CO4       Co5         CO5       Co6         Providing knowledge about ethics, of ethical behavior in carrying out the profession in the field of electrical envarious spectrums of thought in ethics, the teaching profession, ethical issues implementation and development in technical vocational teacher profession out using the student center learning	during lectures.         CO2       Can carry out the tasks of the Profession course both independently and in groups.         CO3       Mastering the concept of professional error         professional code of ethics of the teacher.       CO4         Able to apply the concept of professional error       code of ethics in carrying out duties as a professional ethics in carrying out duties as a professional ethics.         CO5       Being able to analyze anti-corruption arror         professional ethics.       CO6         Being able to analyze the importance of I Property Rights (IPR) for the teaching profession         CO2       ✓         CO3       ✓         CO4       ✓         CO5       CO4         CO1       ✓         CO3       ✓         CO4       ✓         CO5       CO4         CO4       ✓         CO5       CO4         CO6          Providing knowledge about ethics, ethical awar         ethical behavior in carrying out the vocation         profession in the field of electrical engineering wr         various spectrums of thought in ethics, description o         the teaching profession, ethical issues in the profess         implementation and development in the pract         technical vocat	

	end s	semester	exams, and final seme	ster exams.	
Assessments	Asse achie 1 & 2 1.	essment evements 2), knowle Attitude a each st attendan interactic "Very Go attitude v observat assumpti astitude. as consic course. The fina assessm individua presenta examinat	is carried out to s, namely attitudes of le edge (CO 3 & 4), and s assessment is done thr udent in each lect ce, discipline, perso on. This attitude asses od", "Good", and "Le value is included in the ' ion and / or self-assess ion that basically even The results of this attitude deration to determine the l grades include the re	measure all earning achiever pecial skills (CO rough direct obse ure meeting, onal and inte ssment category ess Good". The "Good" category ment techniques ery student has ude assessment ne final assessm results of the k fic skills obtair group ass tests, and final	5 & 6). ervation of including: erpersonal r, namely: minimum . By using using the s a good are used ent of this mowledge ned from ignments, semester
	No	СО	Assessment Object	Assessment Technique	Weight
	<b>No</b>	<b>CO</b> CO1	Assessment Object Attendance		Weight 5%
		CO1 CO3	-	Technique	
		CO1 CO3 CO4	Attendance	Technique           documentation	5%
		CO1 CO3 CO4 CO5	Attendance Individual assigment	Techniquedocumentationobservation	5% 10&
		CO1 CO3 CO4	Attendance Individual assigment Group assigment	TechniquedocumentationobservationWritten test	5% 10& 5%
		CO1 CO3 CO4 CO5	Attendance Individual assigment Group assigment quiz	TechniquedocumentationobservationWritten testWritten test	5% 10& 5% 15%
		CO1 CO3 CO4 CO5	Attendance Individual assigment Group assigment quiz MID	TechniquedocumentationobservationWritten testWritten testWritten test	5% 10& 5% 15% 20%
		CO1 CO3 CO4 CO5	Attendance Individual assigment Group assigment quiz MID MID 2	TechniquedocumentationobservationWritten testWritten testWritten testWritten testWritten test	5% 10& 5% 15% 20% 20%
	1	CO1 CO3 CO4 CO5 CO6	Attendance Individual assigment Group assigment quiz MID MID 2 Final Exam	TechniquedocumentationobservationWritten testWritten testWritten testWritten testWritten testTotal	5% 10& 5% 15% 20% 20% 20%
Forms of media:	1 Board	CO1 CO3 CO4 CO5 CO6	Attendance Individual assigment Group assigment quiz MID MID 2	TechniquedocumentationobservationWritten testWritten testWritten testWritten testWritten testTotal	5% 10& 5% 15% 20% 20% 20% 100%

	<ul> <li>Direktorat Jenderal Pendidikan Dasar dan Menengah, Kementerian Pendidikan dan Kebudayaan.</li> <li>4. Nanang T. Puspito, NT, dkk, (Ed). (2011). Pendidikan Anti- Korupsi Untuk Perguruan Tinggi. Jakarta: Direktorat Jenderal Pendidikan Tinggi, Kementerian Pendidikan dan Kebudayaan.</li> <li>5. Banindro, B.S. (2015). Implementasi Hak Kekayaan</li> </ul>
	<ul> <li>Intelektual (Hak Cipta, Merek, Paten, Desain Industri), Bidang: Seni Rupa, Kriya, Desain Grafis, Desain Produk. Yogyakarta: Badan Penerbit ISI Yogyakarta, Institut Seni Indonesia</li> <li>7. Oey-Gardiner, M., dkk. (2017). Era Disrupsi : Peluang</li> </ul>
	dan Tantangan Pendidikan Tinggi Indonesia. Jakarta: Akademi Ilmu Pengetahuan Indonesia
Date of revision	18 August 2018



# Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Energy Management
Module level, if applicable:	Undergraduate
Code:	EKO6239
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	5 <sup>th</sup>
Module coordinator:	Dr. Giri Wiyono, M.T
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/Elective Course
Teaching format / class hours per week during the semester:	200 minutes lectures and 240 minutes structured activities per week.
Teaching and Learning Method	Demonstration, Simulation,
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-

	After taking this course the students have ability to:					
		emonstrate piousness to God, high loyalty to ademic values, norms, and ethics				
Expexted Learning	ELO4 Ma	astering basic science and basic electricity				
outcomes:	im	astering work standards, work methods, work plementation, and testing in the field of electric power gineering or industrial automation.				
		ble to plan, implement, and evaluate learning in the ld of electric power or automation				
	CO1	Students devoted to God Almighty and able to show attitudes and behavior that have a noble character,				
	CO2	Students have personal skills in the form of honesty, communication, responsibility, creative and independent),				
	CO2.1	Understand the basic principles of energy management.				
	CO2.2	Understand energy management planning.				
	CO2.3	Understanding energy audit procedures.				
Course outcomes:	CO2.4	Understand basic electricity tariff policies and economic calculations.				
	CO2.5	Analyze installed power capacity.				
	CO2.6	Analyzing the quality of electrical power.				
	CO2.7	Apply energy management techniques to lighting loads.				
	CO2.8	Apply energy management techniques to electric motor loads.				
	CO2.9	Apply energy management techniques to HVAC (Heating, Ventilation, and Air Conditioning) loads.				
	CO2.10	Implement building control and management systems.				

ELO and CO mapping		ELO1	ELO4	ELO5	ELO6	
	CO1	✓				
	CO2		✓	✓	✓	
			I		I	·
Courses Description:	This Energy Management course develops contextual thinking about managing electrical energy on the load side and provides knowledge and skills in conducting electrical energy audits on various types of industrial loads in accordance with applicable procedures and standard requirements and is able to utilize technology as a source of learning. The main studies in this course include: Basic principles of energy management, energy management planning, energy audit procedures, basic electricity tariff policies and economic calculations, installed power capacity analysis, electric power quality, energy management at lighting loads, energy management at electric motor loads , Energy management in HVAC (Heating, Ventilation, and Air Conditioning) loads, Control and building management systems. This lecture is carried out using student centered learning strategies (student center learning). Assessment of lectures uses three elements, namely: active participation in the classroom, communication of interactions in presentations, and competency tests individually and in groups.					
Assesments:	<ol> <li>Assessment is carried out to measure all learning achievements, namely attainment learning achievements (CO 1 and CO2), knowledge (CO1 and CO2), and special skills (CO 2).</li> <li>Attitude assessment is carried out at each meeting by using the method of observation and / or self-assessment with the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if the student shows significantly better or less good attitude compared to the attitude of students in general. The results of the attitude assessment do not become a major component of the student's final grade, but rather as one of the graduation requirements. Students are declared to graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness of students in attending lectures.</li> <li>Final scores include the results of the assessment of attitudes, knowledge, skills obtained from individual assignments, group assignments, presentations, tests (quizzes), Midterm Exams (MID), and Final Semester Exams (FSE) with the following guidelines.</li> </ol>					

	No	СО	Assessment Object	Assessment Technique	Weight	
	1	1 CO1 – Individual Assignment CO2		Presentation	20%	
			Group Assignment	Presentation	20%	
			Final Exam	Written test	60%	
		I		Total	100%	
Forms of media:	Board, LCD Projector, Laptop/Computer					
Literature:	<ol> <li>Albert Thumann and William J. Younger. (2008). Handbook of Energy Audits, Seventh Edition. New York, USA: The Fairmont Press.</li> <li>Douglas J. Harris. (2012). A Guide to Energy Management in Buildings. New York: Spon Press.</li> <li>Frank Kreith and D. Yogi Goswami. (2008). Energy Management and Conservation Handbook, New York: CRC Press.</li> <li>Giri Wiyono. (2016). Manajemen Energi Listrik, Yogyakarta: UNY Press.</li> <li>Smith, Craigh B. (1981). Energy Management Principles. New York: Pergamon Press.</li> <li>Steve Doty and Wayne C. Turner. (2009). Energy Management Handbook, Seventh Edition. New York: The</li> </ol>					
Date of revision	Fairmont Press.     10 August 2018					



# Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Electrical Power System Simulation Lab. Work
Module level, if applicable:	Undergraduate
Code:	EKO6240
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	5 <sup>rth</sup>
Module coordinator:	Dr. Giri Wiyono, M.T.
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/Elective Course
Teaching format / class hours per week during the semester:	200 minutes lectures and 240 minutes structured activities per week.
Teaching and Learning Method	Demonstration, Simulation
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-

	After taking	this course the students have ability to:
	Ũ	nonstrate piousness to God, high loyalty to
Expected Learning outcomes:		demic values, norms, and ethics
		carry out work in accordance with the professional of expertise both individually and in teams
	imple	tering work standards, work methods, work ementation, and testing in the field of electric power neering or industrial automation.
		e to plan, implement, and evaluate learning in the of electric power or automation
		e to develop innovations in education, and publish results of his work
		udents devoted to God Almighty and able to show titudes and behavior that have a noble character,
	002	emonstrates responsibility for work in their area of spertise independently.
	002.1	nderstand the basic concepts of electric power stems
	CO2.2 Ur	nderstand electric power system configurations
		nderstand the phenomena and consequences of terruptions in the electric power system
	002.1	nderstand the security settings in the electric ower system
	002.0	nderstanding safety coordination in the electric ower system
Course outcomes:	002.0	nderstand the stability of generators operating in nchronous systems
	ele	nderstand the power requirements needed in an ectric power system to operate safely, reliably and conomically
	000	udents have social skills in the form of ollaboration, and synergy,
	lea as vo	acilitating, evaluating, implementing learning and arning outcomes in a professional manner, as well a community partnerships within the framework of ocational education in carrying out duties as a aching profession
	00111	ommunicate the basic concepts of an electric over system

	CO4.2	CO4.2 Explain the configuration of the electric power system							
	CO4.3	Explain the phenomena and consequences of disturbances in the electrical power system							
	CO4.4	•	Explain the phenomenon of power loss in electric power systems						
	CO4.5	Explain the phenomenon of voltage fluctuations in electric power systems							
	CO4.6	Explain th generators		•	•	•			
	CO4.7	Designing electric pov economica	ver system	•					
	CO4.8	Apply logical, critical, systematic, and innovative thinking in the context of developing or implementing science and / or technology in accordance with their area of expertise							
		ELO1	ELO3	ELO5	ELO6	ELO9			
ELO and CO mapping	CO1	~							
	CO2		<b>~</b>						
	CO3			✓	~	<ul> <li>✓</li> </ul>			
	CO4			~	~	<b>~</b>			
						<u> </u>			
Courses Description:	These skin eyes provide knowledge and skills in conducting power system simulations, both under normal and disruption conditions using the ETAP Power Station computer program. The main studies include: electric power system modeling, electric power system analysis, electric power system simulation principles, introduction of ETAP Power Station, short circuit analysis, load flow analysis, contingency study ), motor starting study, harmonic analysis								

Assessments:	The assessment was conducted to measure all learning outcomes, namely attainment learning achievements (CO 1 and CO 2), knowledge (CO 3), and special skills (CO 4).1. Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if it shows significantly better or less good attitude compared to the attitude of students in general. Attitude assessment also considers the activeness of students following lectures.2. Final scores include the results of the assessment of attitudes, knowledge, and skills obtained from individual assignments, group assignments, presentations, quizzes, Midterm Exams, and End Semester Exams with the following guidelines:NoCOAssessment ObjectAssessment Technique1CO1 - CO4Attitudeobservation10%IGroup assignmentObservation10%Individual assignmentobservation10%Individual assignmentWritten test20%Final ExamWritten test40%II <td< th=""></td<>						
Forms of media:	Boar	d, LCD P	rojector, Laptop/Compu	uter			
Literature:	<ol> <li>Board, LCD Projector, Laptop/Computer</li> <li>Giri Wiyono. (2014). Modul Simulasi Sistem Tenaga Listrik menggunakan ETAP Power Station. Yogyakarta; Jurusan Pendidikan Teknik Elektro FT UNY</li> <li>Giri Wiyono. (2015). Jobsheet Praktik Simulasi Sistem Tenaga Listrik dengan ETAP Power Station, Yogyakarta: Jurusan Pendidikan Teknik Elektro FT UNY</li> <li>Glenn W. Stagg and Ahmed H. El-Abiad. (1988). Computer Methods in Power Systems Analysis. Singapore: McGraw-Hill Inc.</li> <li>Hadi Saadat. (1999). Power System Analysis. Singapore: McGraw-Hill Book Co.</li> </ol>						

	9. MA Pai. (1979). <i>Computer Techniques in Power System</i> <i>Analysis</i> . New Delhi: Tata McGraw-Hill Publishing Company Limited.
	<ol> <li>Ramasamy Natarajan (2002). Computer-Aided Power System Abnalysis. New York: Marcel Dekker Inc.</li> <li>R.N. Dhar. (1982). Computer Aided Power System Operation and Analysis. New Delhi: Tata McGraw-Hill Publishing Company Limited.</li> </ol>
Date of revision	10 August 2018



# Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Laboratorium Management
Module level, if applicable:	Undergraduate
Code:	EKO6241
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	5 <sup>th</sup>
Module coordinator:	Mutaqin, M.Pd., M.T.
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/Elective Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method:	Discussion
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-
Expected learning outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics</li> <li>ELO3 Can carry out work in accordance with the professional field of expertise both individually and in teams</li> </ul>

	<ul><li>ELO4 Mastering basic science and basic electricity</li><li>ELO6 Able to plan, implement, and evaluate learning in the field of electric power or automation</li></ul>						
	ELO7 Able to manage vocational education and training in the field of Electrical Engineering by utilizing information and communication technology						
	CO1	CO1 Students devoted to God Almighty, obedient to worship and show a special attitude, tawadlu, and istigomah,					
	CO2	Demonstra expertise ir	•	•	work in the	eir area of	
	CO3	Knowledge relating to engineering	the work	of prospe	ctive elect	• •	
	CO3.1	Know, une laboratory			•	•	
Course outcomes:	CO4	Analyze and electrical manageme	engineerir	ng by a		elated to aboratory	
	CO4.1	CO4.1 Apply the principles of laboratory management to the work in the field of engineering					
	CO4.2	Analyzing the problem of work in the field of engineering with the principles of laboratory management					
	CO4.3	O4.3 Evaluating the problem of work in the field of engineering with the principles of laboratory management					
	CO4.4 Creating work problems in the field of engineering with the principles of laboratory management					• •	
		ELO1	ELO3	ELO4	ELO6	ELO7	
	CO1	✓					
ELO and CO mapping:	CO2		✓				
	CO3			✓			
	CO4			$\checkmark$	✓	✓	
Courses Description:	Electric Power System Analysis (STL) is a theoretical course given to students to equip capabilities in the field of resource management in the organization of classes, and electrical engineering laboratories, as well as possessing skills in managing resources and activities that cover class management, and laboratories in a comprehensive manner . The material to be taught includes an introduction to laboratory management, laboratory processes, various kinds of electrical						

	infras princi labor deve	engineering laboratories, electrical engineering facilities and infrastructure standards, structuring laboratories with 5S principles, occupational safety and health in laboratories laboratory management information systems, laboratory developments and trends in electrical engineering in the industrial era 4.0 and laboratory optimization.				
	outco gene 1. At obse assur The s if it sh the a asses but ra gradu Attitu follow 2. Fir	omes, na ral skills titude as rvation to mption th student is nows sign tititude of ssment a ather as o uate from de asses ving lectu nal grade (ledge, ge	imely attitudes lea (CO 2), knowledge sessment is carrie echniques and / on the basically every given a value of a hificantly better or least f students in generation one of the graduation one of the graduation this course if at soment also considures. s include the result eneral skills, and sp	but to measure all arning achievements and special skills. and special skills. and special skills. and special skills. and special skills or self-assessment student has a good very good attitude o ral. The results of the nt of the student's fin on requirements. Stu- ers the activeness o as of the assessment becial skills obtained	s (CO 1), ting using the d attitude. r not good mpared to ne attitude nal grade, udents will d attitude. f students	
	quizz		tion Exams, and F	signments, presenta inal Semester Exam		
Assesments:	quizz	es, Inser	tion Exams, and F	•		
Assesments:	quizz follow	es, Inser ving guid	tion Exams, and F elines: Assessment	Assessment	s with the	
Assesments:	quizz follow No	co	tion Exams, and F elines: Assessment Object	Assessment Technique a. Active in class b. Assignment c. Discussion	s with the Weight	
Assesments:	quizz follow No	co	tion Exams, and F elines: Assessment Object Attitude	Assessment Technique a. Active in class b. Assignment c. Discussion d. Presentation a. Quiz b. Duty c. Assignment d. Final exams	s with the Weight 15%	

Forms of media:	Board, LCD Projector, Laptop/Computer
	<ol> <li>Muhamad Ali, et al (2012). Vocational High School Laboratory Management Training Module, Yogyakarta State University, Yogyakarta Indonesia</li> <li>Muhamad Ali, (2017). Industrial Management 4.0 Issue 1, UNY Press Yogyakarta State University, Yogyakarta Indonesia</li> </ol>
	<ol> <li>Fred Grover and Peter Wallace (1979), Laboratory Organization and Management, Butterworth &amp; Co. (publisher) Ltd, London.</li> </ol>
	<ol> <li>G.L. Squires (1986), Practical Physics, J.W. Arrowsmith Ltd, Bristol.</li> </ol>
Literature:	5. Hani Handoko (2012), Management, Second Edition, Faculty of Economics Publishing (BPFE) Universitas
	<ul> <li>Gadjah Mada Yogyakarta Indonesia</li> <li>6. Koontz, H, Weinrich H (2015). Management: A Global Perspective, McGraw Hill New York</li> </ul>
	<ol> <li>Permendiknas No. 28 of 2008 concerning School Facilities and Prassas Standards including laboratory standards for Vocational High School (SMK) and Vocational Al-Madrasah (MAK)</li> </ol>
	<ol> <li>Permendiknas No. 27 of 2007 concerning School Facilities and Prassas Standards including Elementary School (SD) and Middle School (SMP / MTS and SMA</li> </ol>
	<ul> <li>/ MA) laboratory standards</li> <li>9. Mcleod, 2015, Management information system Issue 10, Salemba fourth Publisher, Jakarta. Indonesia</li> <li>10. Other relevant sources.</li> </ul>
Date of revision	10 August 2018



## UNIVERSITAS NEGERI YOGYAKARTA FACULTY OF ENGINEERING DEPARTMENT OF ELECTRICAL ENGINEERING EDUCATION Jalan Colombo Nomor 1 Yogyakarta 55281 Telephone (0274) 586168 ext 276,289,292 , (0274) 586734 , Fax (0274) 586734 Web:ft.uny.ac.id, E-mail: <u>elektro@uny.ac.id</u>

## Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Interfacing Laboratory Work
Module level, if applicable:	Undergraduate
Code:	EKO6242
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	5 <sup>th</sup>
Module coordinator:	Ariadie Chandra Nugraha, M.T
Lecturer(s):	<ol> <li>Didik Hariyanto, M.T.</li> <li>Rustam Asnawi, ST., MT., PhD.</li> </ol>
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/Elective Course
Teaching format / class hours per week during the semester:	200 minutes lectures and 240 minutes structured activities per week.
Teaching and Learning Method	Discussion and Lecturing
Workload:	Total workload is 161 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-

	After tak	ing this course the students have ability to:					
	ELO1 D	Demonstrate piousness to God, high loyalty to academic values, norms, and ethics					
	ELO3 Can carry out work in accordance with the professiona field of expertise both individually and in teams						
Expected learning outcomes:	ELO4 N	LO4 Mastering basic science and basic electricity.					
	iı	Mastering work standards, work methods, work mplementation, and testing in the field of electric power engineering or industrial automation.					
		ble to plan, implement, and evaluate learning in the field of electric power or automation.					
	CO1	Devoted to God and able to show a religious attitude and character.					
	CO2	Demonstrates responsibility for work in their area of expertise independently.					
	CO3	Knowledge of law and the basic theory of electricity.					
	CO3.1	Explain the basic concepts of interfaces and their types, as well as explain in general the interface standards that are widely used.					
	CO4	Knowledge of the preparation of scientific works including work reports in accordance with scientific procedures based on data and information analysis.					
Course Outcomes:	CO4.1	Explains the IEEE 1284 standard for reading input data and sending output data from / to simple devices.					
	CO4.2	Explains the RS-232 standard for reading input data and sending output data from / to simple devices.					
	CO4.3	Explains the USB standard for reading input data and sending output data from / to simple devices.					
	CO4.4	Explain the I2C standard for reading input data and sending output data from / to simple devices.					
	CO4.5	Explain the RFID standard for reading input data.					
	CO4.6	Explains the Bluetooth standard for reading input data and sending output data from / to simple devices.					
	CO5	Apply information and communication technology in carrying out the duties of educators and education					

		personnel.				
	CO5.1	Use the IE send output				
	CO5.2	Using Exp data and devices.				
	CO5.3	Use the Us output data				and send
	CO5.4	Use the I2 output data				and send
	CO5.5	Uses RFID	standards	s to read in	put data.	
	CO5.6	Use the Bl send outpu				
		ELO1	ELO3	ELO4	ELO5	ELO6
	CO1	~				
	CO2		<b>v</b>			
	CO3			✓	✓	$\checkmark$
ELO and CO mapping	CO4			~	<ul> <li>✓</li> </ul>	✓
	CO5			✓	✓	✓
	Interface Engineering Practice is a practical course that aims for students who take this course to have competence to implement commonly used interface protocols, namely IEEE 1284 (Parallel), RS232 (Serial), USB, I2C, Bluetooth and RFID to read input data from the sensor and write data or output commands to the actuator.					

Assessments:	outco and ( 5). 1. At obse assu The s if it s attitu cons 2. Fi and grou Exar guide	<ul> <li>The assessment was carried out to measure all learning outcomes, namely attainment learning achievements (CO 1 and CO 2), knowledge (CO 3 and CO 4), and special skills (CO 5).</li> <li>1. Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if it shows significantly better or less good attitude than the attitude of students in general. Attitude assessment also considers the activeness of students following lectures.</li> <li>2. Final grades include the results of the attitude, knowledge and skills assessment obtained from individual assignments, group assignments, presentations, quizzes, Midterm Examinations, and Final Semester Exams with the following guidelines.</li> </ul>					
		The final mark will be weight as follow:					
	No	CO	Assessment Object	Assessment Technique	Weight		
	1	CO1 – CO5	Attendance	Documentation	10%		
			Practicum report	Written report	30%		
			Practicum skills	Observation	15%		
			Quiz	Written test	10%		
			Final Exam	Practicum	35%		
				Total	100%		
Forms of media:	Boar	Roard LCD Projector Lanton/Computer					
Literature:	<ol> <li>Board, LCD Projector, Laptop/Computer</li> <li>Labsheet (lembar kerja praktikum) Praktik Teknik Antarmuka</li> <li>Axelson, J., &amp; Research, L. (2007). Serial Port Complete: COM Ports, USB Virtual COM Ports, and Ports for Embedded Systems 2nd Edition.</li> <li>Axelson, J., &amp; Research, L. (2009). USB Complete: The Developer's Guide Fourth Edition.</li> </ol>						
Date of revision	18 A	ugust 2018					



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## Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Sensor and Transducer lab. Work				
Module level,if applicable:	Undergraduate				
Code:	EKO6243				
Sub-heading,if applicable:	-				
Classes,if applicable:	-				
Semester:	5 <sup>th</sup>				
Module coordinator:	Amelia Fauziah Husna, M.Pd.				
Lecturer(s):	1. Herlambang Sigit Pramono, S.T., M.Cs.				
Language:	Bahasa Indonesia				
Classification within the curriculum:	Compulsory/Elective Course				
Teaching format / class hours per week during the semester:	200 minutes lectures and 240 minutes structured activities per week.				
Teaching and Learning Method	Discussion, Demonstration, and Lecturing				
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.				
Credit points:	2				
Prerequisites course(s):	-				
Expected learning outcomes:	After taking this course the students have ability to:ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethicsELO3 Can carry out work in accordance with the professiona field of expertise both individually and in teams				

	FLO4 M	astering basic science and basic electricity			
	<ul> <li>ELO5 Mastering work standards, work methods, work implementation, and testing in the field of electric powengineering or industrial automation.</li> <li>ELO6 Able to plan, implement, and evaluate learning in the field of electric powengineering in the field of electric powengineering or industrial automation.</li> </ul>				
	fie	ld of electric power or automation.			
	CO1	Devoted to God Almighty and able to show a regius attitude and character,			
	CO2	Internalize academic values, norms and ethics.			
	CO3	Demonstrates responsibility for work in their area of expertise independently.			
	CO4	Knowledge of law and the basic theory of electricity.			
	CO5	Knowledge of the preparation of scientific works including work reports in accordance with scientific procedures based on data and information analysis.			
	CO5.1	Compile a joystick sensor practice report			
	CO5.2	Prepare reedswitch censorship practice reports			
	CO5.3	Compile flame sensor practice report			
	CO5.4	Prepare a practice report for the MQ-7 sensor			
Course Outcomes:	CO5.5	Prepare a report on the practice of the microphone sound sensor			
	CO5.6	Prepare a PIR censorship practice report			
	CO5.7	Prepare reports on soil humidity sensor practices			
	CO5.8	Prepare a water level sensor practice report			
	CO5.9	Compile a photovoltaic sensor practice report			
	CO5.10	Compile reports related to the working principle of systems that use sensors and transducers			
	CO6	Manage laboratories and workshops in training centers, and technology and vocational education in accordance with the provisions of occupational health and safety in the Electrical Engineering field			
	CO6.1	Identify the types and components of sensors and transducers			
	CO6.2	Assemble the joystick sensor			
	CO6.3	Assemble the reedswitch sensor.			
	CO6.4	Assemble the flame sensor.			
	CO6.5	Assemble the MQ-7 sensor.			

	CO6.6	Assemble	the micro	nhone sou	nd sensor.	
	CO6.7		a PIR ser			
	CO6.8			sture sens	or	
	CO6.9			vel sensor	-	
	CO6.10		•	aic sensors		
	CO6.11	Apply sen	sors and t	ransoucers	s to a work	system.
		ELO1	ELO3	ELO4	ELO5	ELO6
	CO1	✓				
FLO and CO manning	CO2		✓			
ELO and CO mapping	CO3			✓		
	CO4			>	✓	
	CO5			✓	✓	<b>√</b>
	CO6			<b>v</b>	<b>v</b>	✓
Courses Description:	machinery, and mechatronics. This course examines a variety of sensors, such as sensors for light, sound, fire, gas, humidity, magnetism, distance, and solar. This course also learns how to apply and use it in a series. Lectures are carried out using the student center learning approach. The assessment uses an attitude, performance and performance assessment. This subject is a concentration course for the concentration of industrial automation					
Assessments:	<ul> <li>Inits subject is a concentration course for the concentration of industrial automation.</li> <li>Assessment is carried out to measure all learning achievements, namely attainment learning achievement (CO 1 (A.1.1) and CO 2 (A.1.3)), knowledge (CO 4 (K.1.2) and CO 5 (K.2.1)), and skills (CO 6 (S.1.2)).</li> <li>1. Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if it shows significantly better or less good attitude than the attitude of students in general. Attitude assessment also considers the activeness of students following lectures.</li> <li>2. Final grades include the results of an assessment of knowledge, general skills, and special skills obtained from individual assignments, group assignments, presentations, quizzes, Insertion Exams, and Final Semester Exams with the following guidelines.</li> <li>The final mark will be weight as follow:</li> </ul>					

	No	СО	Assessment Object	Assessment Technique	Weight
	1	CO –	Work Attitude	Observation	10%
		CO6	Project Performance	Performance	60%
			Final Project Performance	Practicum	30%
				Total	100%
Forms of media:	Boar	d, LCD F	Projector, Laptop/Cor	mputer	
Literature:	<ol> <li> 2018. Modul Praktik Sensor Joystick, Reedswitch, dan MQ-7. Yogyakarta: UNY</li> <li> 2018. Modul Praktik Sensor Flame, Sound Activation, dan Pressure. Yogyakarta: UNY</li> <li> 2019. Modul Praktik Sensor PIR, Waterlevel, Fotovoltaik. Yogyakarta: UNY</li> <li> 2018. Modul Praktik Sensor Huminity, Load Cell, dan Sharp GP. Yogyakarta: UNY</li> </ol>				ınd IY level,
Date of revision	28 A	ugust 20	18		



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## Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Digital Control
Module level, if applicable:	Undergraduate
Code:	EKO6244
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	5 <sup>th</sup>
Module coordinator:	Dr. Moh. Khairudin
Lecturer(s):	1. Sigit Yatmono, ST.,M.T.
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/Elective Course
Teaching format / class hours per week during the semester:	200 minutes lectures and 240 minutes structured activities per week.
Teaching and Learning Method	Discussion, Simulation, and lecturing
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-

	After taking this course the students have ability to:					
	ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics					
	ELO3 Can carry out work in accordance with the professional field of expertise both individually and in teams.					
Expected learning outcomes:	ELO4 Mastering basic science and basic electricity.					
outcomes:	ELO5 Mastering work standards, work methods, work implementation, and testing in the field of electric power engineering or industrial automation.					
	ELO7 Able to manage vocational education and training in the field of Electrical Engineering by utilizing information and communication technology.					
	CO1 Devoted to God Almighty and able to show the attitude and character regius					
	CO2 Demonstrates responsibility for work in their area of expertise independently.					
	CO3 Knowledge of law and the basic theory of electricity.					
	CO4 Knowledge of the preparation of scientific papers including work reports in accordance with scientific procedures based on data and information analysis.					
Course outcomes:	CO5 Knowledge of identifying, formulating and solving control systems in Electric Power Engineering or Industrial Automation					
	CO6 Identifying and solving current and future problems in Electric Power Engineering or Industrial Automation using the laws and basic theories of electricity within a broader application framework.					
	CO7 Apply automation techniques for electrical and renewable energy (magnetic contactors, power electronics, PLCs, and microcontrollers).					

			ELO1	ELO3	ELO	4 ELO5	ELO7	
	CC	01	✓					
	CC	02		~				
ELO and CO mapping	CC	03			✓	✓		
	CC	04			✓	✓	✓	
	CC	05			✓	✓	✓	
	co	06			~	✓	✓	
	CC	77			✓	✓	✓	
Courses Description:	This course discusses general configuration of digital control systems, other terms, a little history of the development of digital control systems, hardware configurations, various digital controllers, analog / digital conversion, sampling, continuous signaling and discrete time, anchoring zero-order (ZOH), the basics of Transformation Z, switching ratio modeling, digital PID controllers, state-space modeling, signal flow diagrams, state equation solutions, stability analysis, digital filters.							
	achie	ssment vement ledge,a	s, nam	arried ou nely attair 		measure all learning ach	learning nievement,	
	<ol> <li>Attitude assessment is carried out at each meetin observation techniques and / or self-assessment us assumption that basically every student has a good a The student is given a value of a very good attitude or n if it shows significantly better or less good attitude t attitude of students in general. Attitude assessme considers the activeness of students following lectures.</li> <li>Final grades include the results of an assess knowledge, general skills, and special skills obtained individual assignments, group assignments, preser quizzes, Insertion Exams, and Final Semester Exams following guidelines.</li> </ol>						using the d attitude. or not good e than the ment also	
Assessments:							ined from sentations,	
	The final mark will be weight as follow:							
	No	со	Asse	essment Ob	oject	Assessment Technique	Weight	
	1	CO1 – CO7	Attend	dance	1	Documentation	5%	

	Assignment 1,2,3, and 4	Presentation	20%
	Assignment 5	Project Performance	15%
	Quiz	Written test	20%
	Mid	Written test	20%
	Final Exam	Written test	20%
		Total	100%
Forms of media:	Board, LCD Projector, Laptop/Con	mputer	
Literature:	<ol> <li>Astrom, Karl J. and "Computer-controlled Sy Englewood Cliffs, NJ</li> <li>Kuo, Benjamin C.,(1980 Holt, Rinehart and Winsto</li> <li>Franklin, Gene F., et.al Dynamic Systems", Ac Company, Reading, MA.</li> <li>Phillips, Charles L and H Control Systems: Analysis Inc, Englewood Cliffs, NJ</li> </ol>	s <i>tems</i> ", Prentice ) " <i>Digital Control</i> n, Inc., NY. ., (1997) " <i>Digital</i> ddison Wesley H. Troy <b>Nagle</b> , (20	Hall, Inc, Systems", Control of Publishing 14) " <i>Digital</i>
Date of revision	28 August 2018		





FACULTY OF ENGINEERING DEPARTMENT OF ELECTRICAL ENGINEERING EDUCATION Jalan Colombo Nomor 1 Yogyakarta 55281 Telephone (0274) 586168 ext 276,289,292, (0274) 586734, Fax (0274) 586734 Web:ft.uny.ac.id, E-mail: <u>elektro@uny.ac.id</u>

# Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Sociocultural Education
Module level, if applicable:	Undergraduate
Code:	MKU6214
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	6 <sup>th</sup>
Module coordinator:	Prof. Dr. Siti Irene Astuti D, M.Si.
Lecturer(s):	1. Drs. Nurhadi, M.Si.
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Discussion and Lecturing
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-
Expected learning outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrates devotion to YME God, the practice of values, norms, and academic ethics.</li> <li>ELO2 Demonstrate an attitude of nationalism, responsibility, and tolerance towards society and the environment.</li> </ul>

	ELO3 Can carry out work in accordance with the professional field of expertise both individually and in teams.						
	CO1		God Almighty and period		now a religious		
	CO2	and	Respect the diversity of cultures, views, religions, and beliefs, as well as other people's original opinions or findings.				
	CO2.1		ribe the releva ty and culture.	nce between	education and		
	CO2.2		rstand humans etic creatures.	as cultured,	ethical, and		
Course Outcomes:	CO3		Work together and have social sensitivity and ca for the community, and the environment.				
	CO3.1	Unde	rstand human n	ature and civiliz	ation.		
	CO3.2		Understand the nature of humans as individual beings and social beings.				
	CO4	O4 Develop and maintain a network of supervisors, colleagues, colleagues both inside and outside the institution.					
	CO4.1		fy social capit mine the succes				
			ELO1	ELO2	ELO3		
	CO	1	✓				
ELO and CO mapping	CO	2		✓			
	CO	3		$\checkmark$			
	CO	4			✓		
Courses Description:	At the end of the lecture helps students grow the importance of education in encouraging: critical power, creative power, appreciation, and sensitivity of students to social and cultural values in order to establish their personality as a provision for community life as individuals and social beings who: (a) are democratic, civilized, and uphold human values, dignity and care for the preservation of natural resources and the environment, (b) have the ability to master the basics of science, technology and art, (c) have the ability to master basic knowledge about human concepts, culture, values, morals and law, science, technology and art and the environment, and (d) play a role in finding solutions for socio-cultural and environmental solutions wisely and wisely.						

	<ol> <li>The assessment is carried out to measure all lead outcomes, namely attainment learning achievements 1), (CO 2), and (CO 3) (CO 4).</li> <li>Final grades include the results of general knowle assessment obtained from individual assignments, g assignments, presentations, quizzes, Insert Tests, Final Examinations with the following guidelines.</li> <li>The final mark will be weight as follow:</li> </ol>						
Assessments:	No	СО	Assessment Object	Assessment Technique	Weight		
	1	CO2	Attitude (presence, activity, discipline, honesty)	Observation	10%		
	2	CO3 dan CO4	<ul> <li>a. Individual</li> <li>assignments</li> <li>b. Group</li> <li>assignments</li> <li>c. Midterm exam</li> <li>d. Final exams</li> </ul>	<ul> <li>a. Article</li> <li>b. Presentations and Papers</li> <li>c. Written test</li> <li>d. Written test</li> </ul>	15% 15% 20% 40%		
	Total 100						
Forms of media:	Boar	d, LCD F	Projector, Laptop/Con	nputer			
Literature:	<ol> <li>Siti Irene Astuti D. 2016. Pendidikan Sosial Budaya. Yogyakarta: UNY Press.</li> <li>Koentjaraningrat. 1993. Kebudayaan, Mentalitas, dan pembangunan. Jakarta: Gramedia Pustaka Utama.</li> <li>Soejono Soekanto. 2000. Sosiologi Suatu Pengantar. Jakarta: Raja Grafindo Persada.</li> <li>Sudjarwo. 2015. Proses Sosial dan Interaksi Sosial dalam Pendidikan. Bandung: Mandar Maju.</li> </ol>						
Date of revision	19 A	19 August 2018					



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#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Educational Research Method			
Module level, if applicable:	Undergraduate			
Code:	MKP6301			
Sub-heading,if applicable:	-			
Classes,if applicable:	-			
Semester:	6 <sup>th</sup>			
Module coordinator:	Dr. Ketut Ima Ismara, M.Pd.,M.Kes.			
Lecturer(s):	Team			
Language:	Bahasa Indonesia			
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course			
Teaching format / class hours per week during the semester:	150 minutes lectures and 180 minutes structured activities peweek.			
Teaching and Learning Method	Discussion, Brain Storming, Student Centered Learning, and Lecturing, Computer Based Learning.			
Workload:	Total workload is 136 hours per semester which consists of 150 minutes lectures, 180 minutes structured activities, and 180 minutes self-study per week for 16 weeks.			
Credit points:	3			
Prerequisites course(s):	-			
Expected learning outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrates devotion to YME God, the practice of values, norms, and academic ethics</li> <li>ELO2 Demonstrate an attitude of nationalism, responsibility, and tolerance towards society and the environment.</li> <li>ELO3 Can carry out work in accordance with the professional field of expertise both individually and in teams</li> </ul>			

		Mastering work standards, work methods, work implementation, and testing in the field of electric power engineering or industrial automation.
		Mastering work standards, work methods, work implementation, and testing in the field of electric power engineering and industrial automation.
		Able to manage vocational education and training in the field of Electrical Engineering by utilizing information and communication technology
		Able to develop innovations in education, and publish the results of his work
	CO1	Demonstrate polite, honest, good faith in lectures.
	CO2	Contribute to improving the quality of life in a society, nation, state, and advancement of civilization based on Pancasila
Course Outcome:	CO3	Knowledge of the preparation of scientific papers including work reports in accordance with scientific procedures based on data and information analysis.
	CO4	Apply logical, critical, systematic, and innovative thinking in the context of developing or implementing science and / or technology in accordance with their area of expertise.
	CO5	Assessing the implications of the development or implementation of science, technology or art in accordance with their expertise based on the rules, procedures and scientific ethics to produce solutions, ideas, designs, or art criticism and compile scientific descriptions of the results of their studies in the form of thesis or final project report.
	CO6	Make decisions appropriately in the context of problem solving in their area of expertise, based on the results of an analysis of information and data.
	C07	Compile reports of Scientific Works in accordance with scientific procedures based on analysis, information and data and be able to interpret and communicate accurately and accountably in order to solve problems and phenomena that occur related to the profession.

		ELO1	ELO2	ELO5	ELO9		
	CO1	✓					
	CO2		✓				
ELO and CO mapping	CO3			✓			
	CO4				✓		
	CO5				✓		
	CO6				$\checkmark$		
	C07				<ul> <li>✓</li> </ul>		
Courses Description:	This course discusses the knowledge, understanding and application of various research methods in the context of preparing the final project. In lectures discussed various types of research, steps of scientific research ranging from determining the topic, identifying problems, reviewing the literature, determining the focus of the problem, determining the variables, design and design, data collection techniques, analysis and conclusion drawing. Learning activities include lectures with various approaches and methods that involve students, such as discussions, field observations to learn to identify problems and practice making research proposals.						
Assessments	<ul> <li>The assessment was conducted to measure all learning achievements, namely attainment learning achievements (CO 1), general skills (CO 2), knowledge (CO 3), and special skills (CO 4 and CO 5).</li> <li>1. Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if it shows significantly better or less good attitude than the attitude of students in general. The results of the attitude assessment are not a component of the student's final grade, but rather as one of the graduation requirements. Students will graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness of students following lectures.</li> <li>2. Final grades include the results of an assessment of knowledge, general skills, and special skills obtained from individual assignments, group assignments, presentations, quizzes, insert tests, and final semester examinations with the following guidelines.</li> </ul>						

	The final mark will be weight as follow:						
	No CO Assessment Object		Assessment Technique	Weight			
	1	CO2	Presentation	Observation	10%		
	2	CO3 dan CO5	a. Individual assignments	a. Accuracy of program results	20%		
		005	<ul><li>b. Group assignments</li><li>c. Quiz</li><li>d. Final exams</li></ul>	b. Writen	20% 20% 30%		
				Total	100%		
Forms of media:	Board	d, LCD F	Projector, Laptop/Compu	uter			
Literature:	<ol> <li>9. Arikunto, S. 2006. Penelitian Tindakan Kelas. Jakarta : Rineka Cipta.</li> <li>10. Sugiyono. 2006. Metode Penelitian Kuantitatif Kualitatif dan R&amp;D. Bandung: Alfabeta.</li> <li>11. Sachari, Agus (2003). Pengantar Metode Penelitian. Bandung: Erlangga.</li> <li>12. Arikunto, S. (2016). Prosedur Penelitian Suatu Pendekatan Praktik. Jakarta: Rineka Cipta.</li> </ol>						
	<ol> <li>13. Emzir. (2010). Metodologi Penelitian Pendidikan:Kuantitatif dan Kualitatif. Jakarta: Rajawali Pers.</li> <li>14. Tim Tugas Akhir Skripsi(2013). Pedoman Penyusunan Tugas Akhir Skripsi. Yogyakarta.</li> </ol>						
Date of revision		ugust 20					



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#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

· · · ·	Entropropourchin
Module name:	Entrepreneurship
Module level, if applicable:	Undergraduate
Code:	MKU6212
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	6 <sup>rd</sup>
Module coordinator:	Mutaqin, M.Pd.,M.T.
Lecturer(s):	Team
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method:	Discussion and Lecturing
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-
Expected Learning Outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrates devotion to YME God, the practice of values, norms, and academic ethics</li> <li>ELO2 Demonstrate an attitude of nationalism, responsibility, and tolerance towards society and the environment</li> </ul>

		an carry out work in accordance with the professional
	fie	eld of expertise both individually and in teams.
	im	lastering work standards, work methods, work plementation, and testing in the field of electric power ngineering or industrial automation.
		ble to develop innovations in education, and publish e results of his work
	CO1	Demonstrate polite, honest, good faith in lectures.
	CO2	Uphold the value of humanity in carrying out duties based on religion, morals, and ethics.
	CO3	Internalize academic values, norms and ethics.
	CO3.1	Understanding of course orientation, entrepreneurship concepts, and unemployment
	CO4	Respect the diversity of cultures, views, religions, and beliefs, as well as other people's original opinions or findings.
	CO5	Contribute to improving the quality of life in a society, nation, state and the advancement of civilization based on Pancasila.
	CO6	Work together and have social sensitivity and care for the community, and the environment.
	CO6.1	Understand the concept of achievement motivation and determination.
Course outcomes:	CO7	Internalize the spirit of independence, struggle, and entrepreneurship.
	CO7.1	Understand Ethics and social responsibility in business.
	CO8	Demonstrates responsibility for work in their area of expertise independently.
	CO9	Knowledge of the preparation of scientific works including work reports in accordance with scientific procedures based on data and information analysis.
	CO9.1	Demonstrate the ability to think creatively, by thinking about orientation to action.
	CO9.2	Understand the concept of risk, potential risk and its management.
	CO10	Apply logical, critical, systematic, and innovative thinking in the context of developing or implementing science and / or technology in accordance with their area of expertise.

	CO10.1	Able to construct the entrepreneur's character and mindset						
	CO10.2	O10.2 Have achievement motivation in entreprer activities and the ability to work synergistic teams						
	CO10.3	entrepre	know th neurs, con neurs and	duct interv		successful		
	CO11	impleme accordar procedu solutions compile	ng the impl ntation of nce with the res and s, ideas, o scientific de n the form	science, t eir expertise scientific designs, c escriptions	echnology e based on ethics to or art crition of the resu	or art in the rules, produce cism and lts of their		
	CO11.1	0	he ability to iness oppo		usiness pla	an to open		
	CO12	problem	context of based on and data.					
	CO12.1	CO12.1 Identifying new business opportunities that can be developed.						
	CO13	CO13 Compile reports of Scientific Works in accordance with scientific procedures based on analysi information and data and be able to interpret ar communicate accurately and accountably in order to solve problems and phenomena that occ related to the profession.						
	CO13.1		he ability to g reports o					
		ELO1	ELO2	ELO3	ELO4	ELO9		
	CO1	$\checkmark$						
	CO2	$\checkmark$						
	CO3	$\checkmark$						
ELO and CO mapping:	CO4		✓					
	CO5		✓					
	CO6		✓					
	C07			<b>~</b>				
	C08			$\checkmark$				
	CO9				$\checkmark$			

	CO	10					✓
	CO						✓ ✓
	CO	12					✓
	CO	13					✓
		·				i	·
Courses Description:	entre conce / skill spirit motiv respo huma entre The I methe simul	preneur <sup>1</sup> ept of en s. The se / soul a ation, er onsibility, an resour preneuri earning ods inclu ations, a	s spir trepre cope of ntrepre produ rces, b al prad strate iding: nd fie	it / soul neurship, a of this coul aracter of eneurial na iction man ousiness o ctices / lea gy uses th lectures, d ld practice	and ch and prace rse mate entrep ature, be agemen portun rning pr ne stude iscussic and pre	o be able t paracter, unde ctice entreprene erial includes: reneurship, a usiness ethics nt, finance, ma ities, business ojects. ent center ap ons, games, a esentations. E nodel, presen	erstand the neurial skills developing ichievement s and social arketing and s plans, and proach with ssignments, valuation of
	writte	n test.		-		to measure	
Assessment:	3. File control of the second	utcomes kills, kno ttitude a bservatic ssumptic he stude bod if it ompared f the att cudent's equireme ast hav onsiders inal grad nowledge dividual uizzes, in le followi	, name wledg ssess on tecl on that ent is g to the itude final g ents. S e a the ac es inc e, gen assign nsert t ng gu	ely attainm e, and spe ment is canniques ar basically e given a val s significa e attitude o assessme grade, but tudents w good attit ctiveness o lude the re eral skills, ments, gr	ent of le cial skil arried or od / or s every sti- ue of a ntly bet f studer nt are rather a ill gradu ude. A of stude sults of and spo oup ass inal ser	earning attitud ls. ut at each me self-assessme udent has a go very good att ter or less go not a compo as one of the late from this ttitude asses nts following l f an assessme ecial skills obt signments, pre-	des, general eeting using nt using the bod attitude. titude or not bod attitude The results nent of the graduation course if at sment also ectures. ent of ained from esentations,
	No	CO	Ass	essment C	)bject	Assessmen Technique	t Weight
	1	CO11 and	Pres	entation		Observation	10%

	CO13	
	2       CO3, CO4, CO5, and CO6       a. Individual assignments       a. Accuracy of program results         b.       Group assignments       b. Writen         CO6       C. Quiz d. Midterm exam e. Final exams       b. Writen	10% 10% 20% 20% 30% 100%
		100 /8
Forms of media:	Board, LCD Projector, Laptop/Computer	
Literature:	<ol> <li>Abdullah Gymnastiar. (2006). Melipatgandakan F dengan Kecerdasan Spiritual. Bandung. Solusi C</li> <li>Alain Fayolle. (2007).Handbook of Rese Entrepreneurship Education, Volume 2. Belgium Elgar Publishing Limited</li> <li>Buchari Alma. (2006). Kewirausahaan. Edisi ke Bandung: Alfabeta</li> <li>Gerben Blaauw, Peter van der Sijde ,Christoph E (2008). Teaching Entrepreneurship, Cases for E and Training. Netherlands: A Springer Company</li> <li>Geoffrey G. Meredith dkk. (1996) Kewirausaha</li> </ol>	Qalbu. earch in a: Edward esepuluh. Diensberg Education
	<ul> <li>dan Praktek. Edisi kelima. Jakarta: PT Pustaka Pressindo.</li> <li>6. Justin G. Longenecker dkk.(2001). Kewira Manajemen Usaha Kecil. Jakarta: PT. Salemb</li> </ul>	Binaman ausahaan
	<ul> <li>Patria.</li> <li>7. Lynn M. Pearce. (2010). Business Plans H Volume 16. New York: Farmington Hills,</li> <li>8. Rusman Hakim. (1998). Kiat Sukses Berwiraswa Kedua. Jakarta: PT Elex Media Media Komputin</li> </ul>	sta. Edisi
Date of revision:	30 August 2018	



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#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Indonesian Language		
Module level, if applicable:	Undergraduate		
Code:	MKU6209		
Sub-heading,if applicable:	-		
Classes,if applicable:	-		
Semester:	6 <sup>rd</sup>		
Module coordinator:	Zamtinah, M.Pd.		
Lecturer(s):	Team		
Language:	Bahasa Indonesia		
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course		
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.		
Teaching and Learning Method:	Discussion and Lecturing		
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.		
Credit points:	2		
Prerequisites course(s):	-		
Expected Learning Outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO2 Demonstrate nationalism, responsibility, and tolerance to both society and environmet</li> <li>ELO3 Capable to perform professional works in his/her field of expertise both individual and team works</li> <li>ELO8 Capable to apply research and scientific writing methods</li> </ul>		

	CO1	in th	ne community,	mprovement of th the nation, the s lization based on	state, and the		
	CO2	Demonstrating responsibility on the respective profession of expertise in an independent manner.					
	CO2.1		Able to explain the concepts, functions, types, and tunings of the Indonesian language				
Course outcomes:	CO2.2		e to apply ethic iarism	al writing and p	revent acts of		
	CO3	learr	ning assessmer	s, media,learning at on technology a d of electrical eng	and vocational		
	CO3.1		cribe education	that is suitable for	or multicultural		
	CO3.2	Able	e to compile scie	ntific papers			
	CO3.3	Able	e to compile and	present research	proposals		
			ELO2	ELO3	ELO8		
ELO and CO mapping:	CO1		✓				
	CO2			$\checkmark$			
	CO3	6			✓		
Courses Description:	Indonesia other pa make stu realm. Ba and barre types of sources, in Indon understa and type papers b	an st rties idents ased el, rea disco stude esiar nd as s of oth po	udents to be a effectively. Cou s have high com on the mastery ading spelling sl ourse, as well as ents expected to scientific bar spects of scien scientific paper opular, semi-for	are an absolute r ble to express the inses Indonesian munication skills of functions langu kills, sentences, p is reproducing tex be able to write rel. Students are tific papers inclue s, and able to co mal and formal. St hip and refrainin	eir thoughts to is expected to in the scientific age and variety aragraphs, and ts from various and speak well e expected to ding definitions ompile scientific udents are able		

Assessment:	<ol> <li>Assessment is carried out to measure all learning achievements, namely attainment learning achievement (CO 1) and (CO 2) General knowledge (CO 3).</li> <li>Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if it shows significantly better or less good attitude compared to the attitude of students in general. The results of the attitude assessment are not a component of the student's final grade, but rather as one of the graduation requirements. Students will graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness of students following lectures.</li> <li>Final grades include the results of general knowledge assessments obtained from individual assignments, grou assignments, presentations, quizzes, Insert Exams, and Final Examinations with the following guidelines.</li> </ol>				ng s a ne e	
	No	со	Assessment Object	Assessment Technique	Weight	
	1	CO1 and CO2	Attitude (presence, activity, discipline, honesty)	Observation	10%	
	2	CO3	Individual assignments	Article	15%	
			Group assignments	Presentations and Papers	15%	
			Midterm exam	Written test	20%	
			Final exams	TAS proposal	40%	
				Total	100%	
Forms of media:	Boar	d, LCD F	Projector, Laptop/Con	nputer		
Literature:	<ol> <li>Amien, M. (1995) Pedoman penulisa karya ilmiah. Yogyakarta: Program Pasca Sarjana UNY</li> <li>Andi Baso Mappatoto (1993) Teknik penulisan feature (Karangan Khas). Jakarta: Gramedia</li> <li>Brotowijoyo, Mukayat D. (2002). Penulisan Karangan Ilmiah. Jakarta: Akademika Pressindo</li> <li>Dirjen Dikti Kemdikbud RI (2013) Materi Kuliah Bahasa Indonesia</li> <li> (1990) Bahan Penataran Penelitian Dasar dan Penulisan Karya Ilmiah bagi Dosen Muda FPTK IKIP Yogyakarta.</li> <li>Daniel Samad (1997) Dasar-dasar meresensi buku. Jakarta: PT Gramedia Widiasarana Indonesia</li> </ol>					

	<ol> <li>Edy Zaqeus (2005) Resep cespleng menulis buku best seller: Jurus jitu menulis buku laris untuk orang sibuk seperti anda. Yogyakarta: Gradien Books</li> </ol>
	8. Haryanto, AG. (1993) Seluk beluk penyusunan karya ilmiah. Jakarta: Hipokrates.
	<ol> <li>Isnani, AS. Suryono. (2008) Plagiarisme. Pengembangan Wwaasan Redaksi. Media Aesculapius Departemen Farmakologi FKUI.</li> </ol>
	10. Kamus Besar Bahasa Indonesia (2001). Pusat Bahasa Depdiknas. Jakarta: Balai Pustaka
	11. Keraf, Gorys. 1997. Komposisi, sebuah PengantarKamahiran Bahasa. Ende: Penerbit Nusa Indah.
	12. Kuncoro, Mudrajat. (2009) Mahir menulis. Kiat jitu menulis artikel opini, kolom, dan resensi buku. Jakarta: Penerbit Erlangga
	13. Permendiknas No. 17 Tahun 2010 tentang Pencegahan dan Penanggulangan Plagiat di Perguruan Tinggi.
	14. Ramlan, M. dkk. (1994) Bahasa Indonesia yang salah dan yang benar. Yogyakarta: Andi Offset.
	15. Soekamto, dkk (1995) Pedoman penelitian. Lembaga Penelitian IKIP Yogyakarta
	16. Sriyana, Jaka (2012) Kode etik penulis dan etika kepenulisan karya ilmiah.
	17. Sugiyono (2005) Metode penelitian administrasi. Bandumg : Alfabeta
	18 (2006) Statistika untuk penelitian. Bandung : Alfabeta
	19(2013) Cara mudah menyusun: skripsi, tesis, dan disertasi. Bandung: Alfabeta
	20. Suharsimi Arikunto (1989) Prosedur penelitian suatu pendekatan praktik. Bandung : Bina Aksara
	21. Wahyu Wibowo (2002) 6 langkah jitu agar tulisan anda makin hidup dan enak dibaca. Jakarta : Gramedia Pustaka Utama
	22. Undang-Undang No. 12 Tahun 2010 tentang Pendidikan Tinggi
Date of revision:	31 August 2018



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# Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Transmission and Distribution lab. Work			
Undergraduate			
EKO6245			
-			
-			
6 <sup>th</sup>			
Dr. Giri Wiyono, M.T			
1. Dr. Zamtinah 2. Faranita Surwi, M.T.			
Bahasa Indonesia			
Compulsory/ <del>Elective</del> Course			
200 minutes lectures and 240 minutes structured activities per week.			
Demonstration, Simulation.			
Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.			
2			
-			
<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics</li> <li>ELO3 Capable to perform professional works in his/her field of expertise both individual and team works</li> </ul>			

	FLO4 M	Aaster in basic sciences and principles of electric
	ELO5 N ir	Master in work standards, work methods, work nplementations, and testing in electric power or industrial automation expertise.
	e	Capable to manage vocational education and training of lectrical engineering expertise by utilizing information nd communications technology
	CO1	Being pious to God Almighty and able to demonstrate religiousness, honesty, and patience.
	CO2	Demonstrating responsibility on the respective profession of expertise in an independent manner.
	CO3	Knowledge on the law and basic theories of electricity.
	CO3.1	Analyze the load characteristics of R, L and C on DC and AC sources
	CO4	Knowledge on developing scientific paper, including work report that is in line with scientific procedure based on the analysis, information, and data, and the ability to interpret and communicate in an accurate and accountable manner in order to solve problems and phenomena related to the occupation.
	CO4.1	Conduct analysis and compile reports based on the results of practices implemented.
Course outcomes:	CO5	Knowledge on the power plant, distribution, use, installation, and electrical automation engineering in businesses and industry according to the standards and principles that apply generally and are relevant with electrical power and renewable energy.
	CO5.1	Determine the phase sequence method, Analyze parameters that affect the real and reactive power flow, Evaluate the stability of the transition in the power system
	CO6	Have full understanding and mastery on the transmission theory and electrical power distribution.
	CO6.1	Identifying the main and supporting components in transmission and distribution channels
	CO6.2	Analyzing the amount of electricity in the transmission line
	CO6.3	Analyze the mounting characteristics of synchronous capacitors on long channels

		ELO1	ELO3	ELO4	ELO5	ELO7
	CO1	<ul> <li>✓</li> </ul>				
	CO2		✓			
ELO and CO mapping	CO3			✓		
	CO4				✓	
	CO5					$\checkmark$
	CO6					✓
Courses Description:	to users. characteria sequence simple trans angle on t real and rea transfer ca and synch low loads, 1. Asses achiev	The scop stics of R, checking, nsmission he transm eactive pow apacity, alt ironous ca and the st ssment is c vements, r	e of this L and C voltage re line, simula ission line, wer, use of cernators, sy pacitors, sy cability of p carried out namely atta	course ma at DC and egulation a ation of vol paramete transforme synchronous ower syste to measure inment lea	aterial inclu AC source and power tage drop rs that affe ers to incre us motors, s motor op m switchin e all learnir rrning achie	ng evements
Assesments:	<ul> <li>4), an</li> <li>2. Attitude</li> <li>observed</li> <li>the asserved</li> <li>attitude</li> <li>good</li> <li>generved</li> <li>compoficities</li> <li>follow</li> <li>3. Final weight</li> <li>knowled</li> <li>individe</li> <li>preseved</li> </ul>	Id special s de assessr vation tech ssumption de. The stu de or not gu attitude co ral. The res onent of the graduation this course ssment also ring lecture grades inc ledge, gen dual assign ntations, q	skills (CO 5 nent is car nniques an that basica dent is giv ood if it sho mpared to sults of the e student's n requirem if at least o considers s. lude the re eral skills, ments, gro uizzes, ins	2), knowled in and CO 6 ried out at d / or self-a ally every s en a value ows signific the attitude attitude as s final grad ents. Stude have a good s the active sults of the and specia oup assign ert tests, a wing guide	). each meet assessmer tudent has of a very g cantly bette e of studer sessment e, but rathe ents will gr od attitude. eness of str e assessme l skills obta ments, nd final se	ing using a good good er or less ats in are not a er as one aduate Attitude udents ent of ained from

	No	СО	Assessment Object	Assessment Technique	Weight
	1	CO2	Presentation	Observation	10%
	2	,	Individual Assignment	1. Accuracy	10%
		CO4, CO5,	Group Assignment	of program results	10%
		and	Quiz	2. Written	20%
		CO6	Midterm Exam		20%
			Final Exam		30%
				Total	100%
Forms of media:	Boar	d, LCD F	Projector, Laptop/Compu	uter	
	1. 2.	Penerb Gupta,	uk. (1993). Transmisi it Erlangga JR. (1981). A Course I Publishing House.	-	
Literature:	3. Pansini,		, Anthony J. (2006) ering. USA: Taylor & Fra		stribution
	4.		, Hadi. (1999) s.Singapore: Mc Graw ł	. Power Hill	System
Date of revision	10 A	ugust 20	)18		



FACULTY OF ENGINEERING DEPARTMENT OF ELECTRICAL ENGINEERING EDUCATION Jalan Colombo Nomor 1 Yogyakarta 55281 Telephone (0274) 586168 ext 276,289,292, (0274) 586734, Fax (0274) 586734 Web:ft.uny.ac.id, E-mail: <u>elektro@uny.ac.id</u>

#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Micro Teaching
Module level, if applicable:	Undergraduate
Code:	EKO 6246
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	6 <sup>th</sup>
Module coordinator:	Dr. phil. Nurhening Yuniarti, M.T.
Lecturer(s):	Dr. Istanto Wahyu Djatmiko, M.Pd. Dr. Edy Supriyadi, M.Pd. Dr. Drs. Haryanto, M.Pd.,M.T. Dr. Sunaryo Soenarto,MPd.
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	The form of learning is in the form of lectures, which consist of: (1) 150 minutes of face-to-face activities per week per semester; (2) structured assignment activities 120 minutes per week per semester; and (3) 120 minutes of independent activities per week per semester.
Teaching and Learning Method	Discussion, Demonstration, and Lecturing
Workload:	Total workload is 40 hours of face-to-face activities per semester
Credit points:	3
Prerequisites course(s):	-
Expected learning outcomes:	After taking this course the students have ability to:

	ELO1 D	emonstrates devotion to YME God, the practice of
		alues, norms, and academic ethics
		bhold the value of humanity in carrying out duties based n religion, morals, and ethics.
	in	Mastering work standards, work methods, work nplementation, and testing in the field of electric power ngineering or industrial automation.
		ble to plan, implement, and evaluate learning in the eld of electric power or automation.
		ble to apply research methods and preparation of cientific works
	CO1	Students fear God and be able to show a religious attitude and character,
	CO2	Uphold the confidentiality of his work, honest and fair in carrying out duties based on religion, morals, and ethics.
	CO3	Knowledge of the preparation of scientific works including work reports in accordance with scientific procedures based on data and information analysis.
	CO3.1	Understand the basics of Vocational Learning Management.
	CO3.2	Develop a Micro Teaching Learning Plan (RPP).
	CO3.3	Understand 8 basic learning skills
	CO4	Implement innovative learning models that are relevant to the characteristics of students.
Course Outcomes	CO4.1	Practicing basic teaching skills is limited.
	CO4.2	Practice the basic skills of integrated teaching in learning theory.
	CO4.3	Practice basic integrated teaching skills in practical learning in the laboratory.
	CO4.4	Practice the basic skills of integrated teaching in practical learning in the workshop.
	CO5	Facilitating, evaluating, implementing learning and learning outcomes professionally, as well as community partnerships within the framework of vocational education in carrying out their duties as a teaching profession.
	CO5.1	Skillfully simulates 8 basic teaching skills.

		E	L01	ELO2	ELO5	ELO6	ELO8
	CO	I	✓				
ELO and CO manning	CO	2		$\checkmark$			
ELO and CO mapping	CO	3			✓		
	CO	1					✓
	CO	5				✓	
Courses Description:	studer compe prepa limited learnin works The a achiev 1), ge	ats to etencies ration of ng theo nop. assessr rements neral sl	have s, pe s throu of less tice of ory, pra ment w s, nam kills (C	pegagogic ersonality ugh: under on plans, j basic tea actice in th was condu- ely attainm	cal compete compete rstanding practice of ching skill ne laborato ucted to m nent learning	tencies, p ncies, ai basic teac basic tea s integrate ory, as wel measure a ng achieve	visions for rofessional hing skills, ching skills ed, both in I as in the all learning ments (CO pecial skills
Assessments	<ol> <li>general skills (CO 2), knowledge (CO 3), and special s (CO 4 and CO 5).</li> <li>Attitude assessment is carried out at each meeting u observation techniques and / or self-assessment using assumption that basically every student has a g attitude. The student is given the attitude rating: not g good enough, good, and very good. The results of attitude assessment are not a component of the stude final grade, but rather as one of the gradua requirements. Students will graduate from this course least have a good attitude. Attitude assessment considers the activeness of students following lectures</li> <li>The final grade includes the accumulation of assessm for each meeting as referred to by the weight of assessment.</li> </ol>				nt using the as a good p: not good, sults of the e student's graduation course if at sment also ectures. sessments		
	No	со	A	ssessmen Object		essment chnique	Weight
	1	CO1 - CO7	funda	erstand the amentals o Teaching	f Wr	itten test	10%
				observatio		signment	10%
			Com syllal	pose of ous	Ass	signment	10%
			Com	pose of	Ass	signment	

	learning implementation plan		15%
	Practicing the limited of basic teaching skills	Performing Test	10%
	Practicing the basic skills of integrated teaching in learning theory.	Performing Test	10%
	Practice basic integrated teaching skills in practical learning in the laboratory.	Performing Test	15%
	Practice the basic skills of integrated teaching in practical learning in the workshop.	Performing Test	20%
		Total	100%
Forms of media:	Board, LCD Projector, Laptop/Com	puter	
	15. Barnawi & M. Arifin (2012). Teo efektif & Kreatif. Bandung: Ar- F		ngajaran yg
Literature:	16. Dewa Ayu Eka Agustini, Luh Padmadewi. (2010) Pengantar Balai Pustaka		
	17. Arif Sardiman. (2001). Med Pustekkom Diknas.	dia Pendidikar	n. Jakarta:



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#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Electrical Power Plant
Module level,if applicable:	Undergraduate
Code:	EKO6247
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	6 <sup>th</sup>
Module coordinator:	Dr. phil. Nurhening Yuniarti, M.T
Lecturer(s):	<ol> <li>Muhfizaturrahmah, S.T., M.Eng</li> <li>Eko Swi Darmawan, M.Pd.</li> <li>Eko Prianto, M.Eng.</li> </ol>
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Discussion
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-
Expected Learning Outcomes:	<ul> <li>After taking this course the students have ability to</li> <li>ELO1 Demonstrates devotion to YME God, the practice of values, norms, and academic ethics.</li> <li>ELO3 Can carry out work in accordance with the professional field of expertise both individually and in teams.</li> </ul>

	ELO5 l ir e	Mastering ba Mastering mplementati engineering o	work stan on, and tes or industria	dards, we sting in the I automation	ork metho field of elec on.	ods, work ctric power	
	fi	ble to mana ield of Elect and commun	trical Engir	neering by			
	CO1	Fear God / attitude, ho	•••		to show a	religious	
	CO2	Demonstra expertise ir			work in the	eir area of	
	CO3	Knowledge	of law and	I the basic	theory of e	electricity.	
Course Outcomes:	CO4	Knowledge including w procedures	ork report	s in accord	dance with	scientific	
	CO5	CO5 Knowledge of the generation, distribution, use, installation and engineering of electric power automation in the business world and industry in accordance with the standards and principles that are generally accepted and relevant in the field of electricity and renewable energy.					
	CO6 Analyzing the application of materials related to Electric Power Engineering or Industrial Automation for the development of renewable energy development.						
	C07	Apply the t and energy					
		ELO1	ELO3	ELO4	ELO5	ELO7	
	CO1	✓					
	CO2		✓				
ELO and CO mapping	CO3			✓			
	CO4				✓		
	CO5					✓	
	CO6					✓	
	C07					✓	
Courses Description:	This course studies the working principles of Steam Power Plants (PLTU), PLTG, PLTA, PLTN and other alternative power plants such as micro hydro, solar, wind, and wave power plants. In addition, studies are also related to initial movers and electrical equipment in power plants; cable or grid lines from the generator to the transformer and substation; plant operation; parallel generator; control system at the plant; and						

	interconnection systems in generation. Students are taught to carry out disturbance analysis and generator recovery processes; power change analysis and power plan optimization; and cost analysis and generation management.				
Assessments:	outco (A.1. (K.2. (S.2. 1. At obse assu The s if it s attitu asses but ra gradu Attitu follow 2. Fi know indivi and F	omes, na 1) and (C 1)); and 10)). titude as rvation to student is shows sig de of stu- shows sig de of stu- shows sig de of stu- shows sig de asses ving lectu- inal grace dual ass final Sem	les include the resulent eneral skills, and spe signments, group assist nester Exams with the	ning achievemen ge (CO 3 (K.1.2) CO 6 (S.2.9), a put at each mee self-assessment ident has a goo y good attitude o ss good attitude ne results of th f the student's fi equirements. Str ast have a good the activeness of the activeness of the activeness of lts of an asses ecial skills obta ignments, Insert following guideli	nts (CO 1 and CO 4 and (CO 7 ating using using the d attitude. r not good e than the le attitude nal grade, udents will d attitude. of students ssment of ined from ts Exams,
	The f	inal mark	will be weight as follo Assessment Object	Assessment	Weight
	1	CO1 dan CO2	Attitude (presence, activity, discipline, honesty)	Technique           Observation	10%
	2	CO3, CO4, CO5, CO6, dan CO7	<ul> <li>a. Individual assignments</li> <li>b. Group assignments</li> <li>c. Midterm exam</li> <li>d. Final exams</li> </ul>	Written test	15% 15% 20% 40%
				Total	100%
Forms of media:	Boar	d, LCD P	rojector, Laptop/Comp	outer	
Literature:	<ol> <li>Board, LCD Projector, Laptop/Computer</li> <li>Breeze, Paul. (2005). Power Generation Technologies. Hongkong: Newnes.</li> <li>Dandekar. (1991). Pembangkir Listrik Tenaga Air. Jakarta: UI- Press.</li> <li>Djiteng Marsudi. (2005). Pembangkit Energi Listrik. Jakarta: Erlangga.</li> </ol>				

	<ol> <li>El Wakil. (1992). Instalasi Pembangkit Daya Jilid I. Jakarta: Erlangga.</li> <li>Grigsby, Leonard L. (2007). Electric Power Generation, Transmission, and Distribution (Electric Power Engineering Handbook). New York: CRC.</li> <li>Keljik, Jeffrey J. (2008). Electricity 3: Power Generation and Delivery. Singapore: Delmar Cengage Learning.</li> <li>Mahon, L.L.J. (1992). Diesel Generator Handbook. New York: Butterworth.</li> <li>Pansini, Anthony J. &amp; Smalling, K. D. (2005). Guide to Electric Power Generation. Texas: Fairmont Press.</li> <li>PLN. (2002). Pembangkit Tenaga Listrik. Jakarta: PLN.</li> <li>Sigalingging, K. (1994). Pembangkit Listrik Tenaga Surya. Bandung: Tarsito.</li> <li>Singh, S. N. (2004). Electric Power Generation Transmission and Distribution. New Delhi: Prentice-Hall of India Pvt. Ltd.</li> <li>Soelaiman. (2004). Pembangkitan Energi Elektrik. Bandung: Lab Konversi Energi Elektrik Jurusan Teknik Elektro ITB.</li> <li>Willis, H. Lee. (2000). Distributed Power Generation: Planning and Evaluation. New York; CRC.</li> <li>Wood, Allen J. dan Wollenberg, Bruce F. (2001). Power Generation, Operation, and Control. New Yersey: Wiley- Interscience.</li> </ol>
Date of revision	30 August 2018



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# Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Electrical Power Plant Lab. Work
Module level, if applicable:	Undergraduate
Code:	EKO6247
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	6 <sup>th</sup>
Module coordinator:	Dr. phil. Nurhening Yuniarti, M.T
Lecturer(s):	<ol> <li>Muhfizaturrahmah, S.T., M.Eng</li> <li>Eko Swi Darmawan, M.Pd.</li> <li>Eko Prianto, M.Eng.</li> </ol>
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	200 minutes lectures and 240 minutes structured activities per week.
Teaching and Learning Method	Demonstration, Simulation.
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-
Expected learning outcomes:	After taking this course the students have ability to: ELO1 Demonstrates devotion to YME God, the practice of values, norms, and academic ethics.

		an carry out eld of exper					
	ELO4 N	lastering ba	sic science	e and basio	c electricity	<i>'</i> .	
	in	lastering v nplementation ngineering c	on, and tes	sting in the	field of ele		
	fie	ole to managed ald of Elect nd commun	rical Engir	neering by		•	
		Fear God A attitude, ho			to show a	religious	
		Demonstrat expertise in	-	-	work in the	eir area of	
Course Outcomes	CO3	Knowledge	of law and	I the basic	theory of e	electricity.	
		Knowledge including w procedures	ork reports	s in accord	dance with	scientific	
	CO5 Knowledge of the generation, distribution, use, installation and engineering of electric power automation in the business world and industry in accordance with the standards and principles that are generally accepted and relevant in the field of electricity and renewable energy.						
	CO6 Analyzing the application of materials related to Electric Power Engineering or Industrial Automation for the development of renewable energy development.						
		Apply the					
		ELO1	ELO3	ELO4	ELO5	ELO7	
	CO1	<ul> <li>✓</li> </ul>					
	CO2		✓				
	CO3			✓			
ELO and CO mapping	CO4				✓		
	CO5					✓	
	CO6					✓	
	C07					✓	
Courses Description:	PLTU, PL to learn t	ject studies _TA, PLTG he characte stallation an	and PLTN ristics of a	simulation Iternators;	. Students paralleling	are taught generato;	

	wind power plants; microhydro installation and operation; operation, maintenance and repair of generators; Diesel power generation equipment (PLTD); operation, maintenance and repair of PLTD. In addition, this course also studies the simulation of Load frequency control of power stations using LQR and Robbust methods, and conducts field studies on power plants.				
	outco (A.1. (K.2. (S.2. 1. At obse assu The s if it s attitu asses but ra gradu Attitu follov	omes, na 1) and (0 1)); and 10)). titude as rvation to mption the student is shows sig de of st ssment a ather as of uate from de asses ving lectu	nent was conducted amely attainment lear CO 2 (A.3.2)); knowled skills (CO 5 (S.2.2), sessment is carried of echniques and / or s nat basically every stu- given a value of a ver gnificantly better or le- udents in general. T are not a component of one of the graduation in this course if at lease sement also considers ares.	ning achievemen ge (CO 3 (K.1.2) CO 6 (S.2.9), a put at each mee self-assessment udent has a goo y good attitude o ess good attitude he results of th of the student's fi requirements. Str ast have a goo	nts (CO 1 and CO 4 and (CO 7 eting using using the od attitude. or not good e than the ne attitude inal grade, udents will d attitude.
Assessments	know indivi	iledge, g idual ass	les include the resu eneral skills, and sp signments, group ass nester Exams with the	ecial skills obta ignments, Inser	ained from ts Exams,
Assessments	know indivi and F	rledge, g idual ass Final Sen final marl	eneral skills, and sp signments, group ass nester Exams with the k will be weight as folk	ecial skills obta ignments, Inser following guideli	ained from ts Exams, nes.
Assessments	know indivi and F	rledge, g idual ass Final Sen	eneral skills, and sp signments, group ass nester Exams with the	ecial skills obta ignments, Inser following guideli	ained from ts Exams,
Assessments	know indivi and F	rledge, g idual ass Final Sen final marl	eneral skills, and sp signments, group ass nester Exams with the k will be weight as folk	ecial skills obta ignments, Inser following guideli ow: Assessment	ained from ts Exams, nes.
Assessments	know indivi and f	final marl CO1 dan	eneral skills, and sp signments, group ass nester Exams with the k will be weight as follo Assessment Object Attitude (presence, activity, discipline,	ecial skills obta ignments, Inser following guideli ow: Assessment Technique	ained from ts Exams, nes. Weight
Assessments	know indivi and F The No	final marl co co co co co co co co co co co co co	eneral skills, and sp signments, group ass nester Exams with the <b>Assessment Object</b> Attitude (presence, activity, discipline, honesty) a. Individual assignments b. Group assignments c. Midterm exam	ecial skills obta ignments, Inser following guideli ow: Assessment Technique Observation	Weight 10% 15% 15% 20%
	know indivi and F The No	final marl co co co co co co co co co co co co co	eneral skills, and sp signments, group ass nester Exams with the <b>Assessment Object</b> Attitude (presence, activity, discipline, honesty) a. Individual assignments b. Group assignments c. Midterm exam	ecial skills obta ignments, Inser following guideli ow: Assessment Technique Observation Written test	Weight 10% 15% 20% 40%
Assessments Forms of media:	know indivi and F No 1 2 Boar	final marifinal marifinal marifinal marification of the second strength of the second stren	eneral skills, and sp signments, group ass nester Exams with the <b>Assessment Object</b> Attitude (presence, activity, discipline, honesty) a. Individual assignments b. Group assignments c. Midterm exam	ecial skills obta ignments, Inser following guideli ow: Assessment Technique Observation Written test Total	ined from         ts Exams,         ines.         Weight         10%         15%         20%         40%         100%

	2. Dandekar. (1991). <i>Pembangkir Listrik Tenaga Air</i> . Jakarta: UI- Press.
	<ol> <li>Djiteng Marsudi. (2005). Pembangkit Energi Listrik. Jakarta: Erlangga.</li> </ol>
	4. El Wakil. (1992). <i>Instalasi Pembangkit Daya Jilid I.</i> Jakarta: Erlangga.
	5. Grigsby, Leonard L. (2007). Electric Power Generation, Transmission, and Distribution (Electric Power Engineering Handbook). New York: CRC.
	6. Keljik, Jeffrey J. (2008). <i>Electricity 3: Power Generation and Delivery.</i> Singapore: Delmar Cengage Learning.
	<ol> <li>Mahon, L.L.J. (1992). Diesel Generator Handbook. New York: Butterworth.</li> </ol>
	8. Pansini, Anthony J. & Smalling, K. D. (2005). <i>Guide to Electric Power Generation</i> . Texas: Fairmont Press.
	9. PLN. (2002). Pembangkit Tenaga Listrik. Jakarta: PLN.
	10. Sigalingging, K. (1994). <i>Pembangkit Listrik Tenaga Sury</i> a. Bandung: Tarsito.
	<ol> <li>Singh, S. N. (2004). Electric Power Generation Transmission and Distribution. New Delhi: Prentice-Hall of India Pvt. Ltd.</li> </ol>
	12. Soelaiman. (2004). <i>Pembangkitan Energi Elektrik.</i> Bandung: Lab Konversi Energi Elektrik Jurusan Teknik Elektro ITB.
	13. Willis, H. Lee. (2000). <i>Distributed Power Generation: Planning and Evaluation</i> . New York; CRC.
	14. Wood, Allen J. dan Wollenberg, Bruce F. (2001). <i>Power Generation, Operation, and Control.</i> New Yersey: Wiley-Interscience.
Date of revision	30 August 2018



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#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Vocational Guidance
Module level, if applicable:	Undergraduate
Code:	KTF6210
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	6 <sup>th</sup>
Module coordinator:	Mutaqin, M.Pd.,M.T.
Lecturer(s):	Dr. Nurhening Yuniarti, M.T.
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/ <del>Elective</del> Course
Teaching format / class hours per week during the semester:	The form of learning is in the form of lectures, which consist of 100 minutes of face-to-face activities per week per semester; (2) structured assignment activities 120 minutes per week per semester; and (3) 120 minutes of independent activities per week per semester.
Teaching and Learning Method	Discussion, Demonstration, and Lecturing
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-
Expected learning outcomes:	After taking this course the students have ability to: ELO1 Demonstrates devotion to YME God, the practice of values, norms, and academic ethics

		Demonstrate an attitude of nationalism, responsibility,
	ELO3 C	nd tolerance towards society and the environment an carry out work in accordance with the professional
	ELO4 I ir e	eld of expertise both individually and in teams. Mastering work standards, work methods, work nplementation, and testing in the field of electric power ngineering or industrial automation.
		ne results of his work
	CO1	Demonstrate polite, honest, good faith in lectures.
	CO2	Uphold the value of humanity in carrying out duties based on religion, morals, and ethics.
	CO3	Internalize academic values, norms and ethics.
	CO3.1	Understand course orientation and the importance of vocational guidance, the scope of meaning and function of vocational guidance
	CO4	Demonstrates responsibility for work in their area of expertise independently.
	CO5	Knowledge of the preparation of scientific works including work reports in accordance with scientific procedures based on data and information analysis.
	CO5.1	Understand the meaning, purpose and function of career guidance and the development of career guidance phases
Course Outcomes	CO5.2	Knowing the achievement of understanding of vocational guidance material
	CO5.3	Having knowledge about the importance of job information
	CO5.4	Having information about job sources
	CO5.5	Understand labor theory and have job analysis skills
	CO6	Apply logical, critical, systematic, and innovative thinking in the context of developing or implementing science and / or technology in accordance with their area of expertise.
	CO6.1	Have an understanding of the scope of vocational guidance methods for implementing vocational guidance
	CO6.2	Knowing the factors that influence the need for vocational guidance, the pattern of implementing vocational guidance
	CO6.3	Producing book reviews related to vocational

		guidance		guidance							
	CO7	Assessing the implications of the development o implementation of science, technology or art in accordance with their expertise based on the rules procedures and scientific ethics to produce solutions, ideas, designs, or art criticism and compile scientific descriptions of the results of their studies in the form of thesis or final project report.									
	CO7.1	Students h job informa		-	is dreame	d of, get a					
	CO8	Make decisions appropriately in the context or problem solving in their area of expertise, based or the results of an analysis of information and data.									
	CO8.1	Identifying new business opportunities that can developed									
	CO9	9 Compile reports of Scientific Works in accord with scientific procedures based on and information and data and be able to interpre- communicate accurately and accountably in or solve problems and phenomena that occur re to the profession.									
	CO9.1	The ability can explair	•	•		ounselor,					
	CO9.2	Having an having rea			ruitment of	f workers,					
	CO9.3	Ability to e and studer	•	•	of work p	blacement					
	CO9.4	Understand evaluation application	of Vocation								
		ELO1	ELO2	ELO3	ELO4	ELO9					
	C01	✓									
	CO2	✓									
	CO3	✓									
ELO and CO mapping	CO4			✓							
	CO5				✓						
	CO6					✓					
	C07					✓ ✓					
	CO8 CO9					✓ ✓					
	009										

Courses Description:	scope influe assur inforr sourc theor techr admi	This course will address the meaning, function, purpose and scope of Vocational Guidance in general, the factors that influence the need for Vocational Guidance, the basic assumptions and principles of Vocational Guidance, information which includes job information, work information sources, methods for presenting job information, selection theory employment and career development, counseling techniques, work placement and follow-up, organization- administration-evaluation of vocational guidance, and techniques for making applications / further study.								
Assessments	<ul> <li>The assessment is carried out to measure all learning outcomes, namely attainment of learning attitudes, general skills, knowledge, and special skills.</li> <li>1. Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if it shows significantly better or less good attitude compared to the attitude of students in general. The results of the attitude assessment are not a component of the student's final grade, but rather as one of the graduation requirements. Students will graduate from this course if at least have a good attitude. Attitude assessment also considers the activeness of students following lectures.</li> <li>2. Final grades include the results of an assessment of knowledge, general skills, and special skills obtained from individual assignments, group assignments, presentations, quizzes, insert tests, and final semester examinations with the following guidelines.</li> </ul>									
	The No	final mar CO	k will be weight as follo Assessment Object	w: Assessment Technique	Weight					
	1	CO6 and CO7	Presentation	Observation	10%					
	2	CO3, CO4, CO5, and CO6	a. Accuracy of program results b. Writen	10% 10% 20% 20% 30%						
				Total	100%					

Forms of media:	Board, LCD Projector, Laptop/Computer
Literature:	<ol> <li>Paul C. Green. 1999. Building Robust Competencies: Linking Human Resources System to Organizational Strategis. San-Fransisco: Jossey-Bass Publisher.</li> </ol>
	2. Frans Poeles. 2003. <i>Job Evaluation and Remuneration Strategies</i> . Jakarta: Gramedia.
	<ol> <li>Nick boulter, Murray Dalziel, Jackie. 2003. People and Competencies. Jakarta: Gramedia.</li> </ol>
	4. Peter Sheal. 2003. <i>The Staff Development Handbook</i> . Jakarta: Gramedia.
	5. Margaret Dale. 2003. <i>Succesful Recruitment and Selection</i> . Jakarta: Gramedia.
	<ol> <li>David Clutterbuck &amp; Susan Kernaghan. 2003. The Power of Empowerment. Jakarta: Gramedia.</li> </ol>
Date of revision	31 August 2018



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# Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Flexible Manufacturing System Lab. Work
Module level, if applicable:	Undergraduate
Code:	EKO6255
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	6 <sup>th</sup>
Module coordinator:	Totok Heru Tri Maryadi, M. Pd.
Lecturer(s):	1. Amelia Fauziah Husna, M. Pd.
	2
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/Elective Course
Teaching format / class hours per week during the semester:	200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week.
Teaching and Learning Method	Demonstration, Lecture, Eksperimen, Discussion.
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-
Expected Learning	After taking this course the students have ability to:
Outcomes:	ELO1 Demonstrates devotion to YME God, the practice of values, norms, and academic ethics
	ELO2 Demonstrate an attitude of nationalism, responsibility, and tolerance towards society and the environment

	ELO4 M	lastering basic science and basic electricity
	ELO5 I ir	Mastering work standards, work methods, work mplementation, and testing in the field of electric power engineering or industrial automation.
		Able to plan, implement, and evaluate learning in the eld of electric power or automation.
Course Outcomes:	CO1	Fear God Almighty and be able to show a religious attitude, honest and patient.
	CO2	Internalize academic values, norms and ethics.
	CO3	Obey the law and discipline in social and state life
	CO4	Work together and have social sensitivity and care for the community, and the environment.
	CO5	Knowledge of law and the basic theory of electricity.
	CO5.1	Application of electrical systems in flexible manufacturing systems
	CO5.2	Identifying components and input / output addresses in a flexible manufacturing system (MPS-500)
	CO5.3	Introduction to programming using Simatic Manager
	CO6	Knowledge of the preparation of scientific works including work reports in accordance with scientific procedures based on data and information analysis.
	CO6.1	Prepare reports on the practice of manual station programming
	CO6.2	Compile station automatic programming practice reports
	CO6.3	Prepare reports on communication practices between stations
	CO7	Manage laboratories and workshops in training centers, and technology and vocational education in accordance with the provisions of occupational health and safety in the Electrical Engineering field
	CO7.1	Memrogram manual station MPS-500
	CO7.2	Automatically programming the MPS-500 station
	CO7.3	Mengkomunikasikan antar station

ELO and CO mapping:									
		EI	_01	ELO2	ELO4	ELO5	ELO6		
	CO1		✓						
	CO2		✓						
	CO3			✓					
	CO4			<b>v</b>					
	CO5				✓				
	CO6					✓			
	C07						✓		
Courses Description:	Flexible Manufacturing System Practices are practical activities of identifying equipment, analyzing system processes, programming systems and designing flexible manufacturing systems. Practicum is carried out using the student center learning approach. Competency-based assessment involves active participation, and communication of interactions between individuals and groups. This subject is a concentration course for the concentration of industrial automation.								
Assessments.	<ol> <li>The assessment was conducted to measure all learning achievements, namely attainment learning achievements (CO 1 (A.1.1) and CO 2 (A.1.3)), knowledge (CO 5 (K.1.2) and CO 6 (K.2.1)), and skills (CO 7 (S.1.2)).</li> <li>Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or not good if it shows significantly better or less good attitude compared to the attitude of students in general. Attitude assessment also considers the activeness of students following lectures.</li> <li>Final grades include the results of an assessment of knowledge, general skills, and special skills obtained from individual assignments, group assignments, presentations, quizzes, insert tests, and final semester examinations with the following guidelines.</li> <li>The final mark will be weight as follow:</li> </ol>								
	No	СО	As	sessment Object		essment chnique	Weight		
	(	CO5, CO6,	F	Practice Performance	e .	rformance	60%		
		and CO7	b. F	f each topic inal Project Performance	Periorn	nance	40%		
					Total		100%		

Forms of media:	Board, LCD Projector, Laptop/Computer.						
Literature:	<ol> <li>Crosser, P. 1994. Pneumatic. Indonesia: Didactic Festo</li> <li>Bolton, William. 2003. Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering. London: Pearson Education Limited.</li> <li>Festo Didactic. Learning System for Automation: Fundamentals of Mechatronics.</li> </ol>						
	4. Totok Heru TM. 2013. Labsheet Manufacturing Practice Flexible System. Yogyakarta: Faculty of Engineering UNY						
Date of revision	30 August 2018						



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#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Refrigerant and Air Conditioning Lab Work					
Module level, if applicable:	Undergraduate					
Code:	EKO6250					
Sub-heading,if applicable:	-					
Classes, if applicable:	-					
Semester:	6 <sup>th</sup>					
Module coordinator:	Dr. Djoko Laras BT					
Lecturer(s):	Team					
Language:	Bahasa Indonesia					
Classification within the curriculum:	Compulsory/Elective Course					
Teaching format / class hours per week during the semester:	200 minutes lectures and 240 minutes structured activities per week.					
Teaching and Learning Method	Discussion, Demonstration, and Lecturing					
Workload:	Total workload is 161 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.					
Credit points:	2					
Prerequisites course(s):	-					
	After taking this course the students have ability to:					
Exported lograins subcomes:	ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics					
Expected learning outcomes:	ELO3 Capable to perform professional works in his/her field of expertise both individual and team works					
	ELO4 Master in basic sciences and principles of electric					

	tł	ELO7 Capable to manage vocational education and training in the field of Electrical Engineering by utilizing information and communication technology								
	CO1	Being pious to God Almighty and able to demonstrate religiousness, honesty, and patience.								
	CO2	Demonstrating responsibility on the respective profession of expertise in an independent manner.								
	CO3	Knowledge on the principles of Mathematics and Physics in relation to the principles of electrical power								
	CO3.1	Understanding mathematical principles in cooling techniques								
	CO3.2	Understanding the principles of physics in cooling techniques								
	CO4	Knowledge on the law and basic theories of electricity.								
	CO4.1	Explain the cooling system and air system								
	CO4.2	Perform cooling load calculations								
	CO4.3	Determine the distribution of air conditioning and air conditioning								
Course Outcomes	CO4.4	Explain the mechanical systems of cooling and air conditioning								
	CO4.5	Explain the electrical system cooling and air conditioning								
	CO5	Have full mastery on the concept of electrical power quality and how to conduct repairmen of electrical power profile.								
	CO5.1	Designing cooling and air conditioning pipelines								
	CO5.2	Piping cooling and air conditioning								
	CO5.3	Installing the engine cooling and air conditioning								
	CO5.4	Emptying refrigerant material								
	CO5.5	Refilling refractory material								
	CO6	Apply electrical power engineering safety system for safety of the equipment as well as user health and safety.								
	CO6.1	Conduct analysis on engine maintenance and air conditioning								
	CO6.2	Perform maintenance and repair of engine coolants and air conditioning								
	CO6.3	Conduct engine and air conditioning checks								

	CO6.4 Conduct engine and air conditioning testing							
				ELO1	ELO3	ELO4	EL07	
		CC	D1	✓				_
		CC	02		✓			_
ELO and CO mapping		CC	03			✓		_
		CC	04			✓		
		CC	D5				✓	
		CC	<b>D</b> 6				✓	
Courses Description:	The Refrigerant and Air Conditioning course is a practical course that studies the symbols of refrigeration and ac systems, the basis of refrigeration engines, refrigeration systems and ac. Understanding and practice of work systems or operation of cooling machines, mechanical & electrical systems of cooling machines. Calculation and selection of engine coolant components, cooling loads, air distribution, electricity, maintenance repairs, inspections, and test commissioning of coolant engines.							
Assessments	<ol> <li>The assessment was conducted to measure all learning achievements, namely attainment learning achievements (CO 1 (A.1.1) and CO 2 (A.3.2)), knowledge (CO 3 (K.1.1) and CO 4 (K.1.2)), and skills (CO 5 (S.2.15) and CO 6 (S.2.18).</li> <li>Attitude assessment is carried out at each meeting using observation techniques and / or self-assessment using the assumption that basically every student has a good attitude. The student is given a value of a very good attitude or nor good if it shows significantly better or less good attitude compared to the attitude of students in general. Attitude assessment also considers the activeness of students following lectures.</li> <li>Final grades include the results of an assessment of knowledge, general skills, and special skills obtained from individual assignments, group assignments, presentations quizzes, insert tests, and final semester examinations with the following guidelines.</li> </ol>							
	No	CO	A	ssessme	nt Object		sment nique	Weight
	1	CO1,	Qu	iz (essay	questions	) Knowl	edge	5%
		CO2, CO3, CO4,		S (Essay estions)		Knowl	edge	10%
		CO5,	UA	S (Essay	Question)	Knowl	edge	15%
		and	Pre	esentation		Knowl	edge	5%

		CO6		and attitude		
			Observation of learning processes and attitudes	Liveliness and attitude	5%	
			Assessment of practice (observation of process and results)	Special skills and attitudes	50%	
			Practice report	Special Knowledge & Skills	10%	
				Total	100%	
Forms of media:	Boar	d, LCD F	Projector, Laptop/Compu	uter		
Literature:	C In 2. B 3. C sy 4. D R 5. M U 6. S E F 7. S	onditionir c. SN. (200 arrier AC /stem De aikin (19 efrigeration cQuay. ( nits, McC chneider, lectric macna. (	AD (1975). Modern ng. Holland: The Goo 0). PUIL 2000, Badan S company (1965). Hand sign. New York: McGrav 089). Service Manual on Equipment. Japan: D (1999). High Static Dir Quay Air Conditioning. (2010). Katalog Prod (2013). HVAC Sysytem	dheart-Willcox Standar Nationa Ibook of Air C w-Hill Book Co " Air Conditi Daikin. rect Expansior duk, Jakarta.	Company al. onditioning ompany. oning and n Fan Coil Schneider	
	<ul> <li>Smacna Inc.</li> <li>8. Stoecker, WF and Jones, JW (1982). Refrigeration and Conditioning. Singapore: McGraw-Hill Book Company.</li> <li>9. Sucaco, PT. (2011). Low Voltge PVC Insulated Of Jakarta: Supreme Cable Manufactoring Corp. Tbk</li> <li>10. Traister, JE. (2009). Electrical Applications Guidel Virginia: Reston Publishing Campany.</li> </ul>					
Date of revision	18 A	ugust 20	18			



#### UNIVERSITAS NEGERI YOGYAKARTA FACULTY OF ENGINEERING DEPARTMENT OF ELECTRICAL ENGINEERING EDUCATION Jalan Colombo Nomor 1 Yogyakarta 55281 Telephone (0274) 586168 ext 276,289,292 , (0274) 586734 , Fax (0274) 586734 Web:ft.uny.ac.id, E-mail: <u>elektro@uny.ac.id</u>

#### Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Electrical Power System Operation
Module level, if applicable:	Undergraduate
Code:	EKO6251
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	6 <sup>th</sup>
Module coordinator:	Toto Sukisno, M.Pd.
Lecturer(s):	1. Ir. Muhamad Ali, M.T.
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/Elective Course
Teaching format / class hours per week during the semester:	100 minutes lectures and 120 minutes structured activities per week.
Teaching and Learning Method	Discussion
Workload:	Total workload is 91 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-
Expected Learning outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics</li> <li>ELO3 Capable to perform professional works in his/her field of expertise both individual and team works</li> </ul>

	ir	Aaster in work standards, work methods, work nplementations, and testing in electric power or ndustrial automation expertise.
	ELO6 C	Capable to make plans, implement, and evaluate earning in electric power or industrial automation xpertise
	ELO9 C	Capable to develop a vocational education innovation nd publish scientific paper
	CO1	Being pious to God Almighty and able to demonstrate religiousness, honesty, and patience.
	CO2	Demonstrating responsibility on the respective profession of expertise in an independent manner.
	CO3	Knowledge on developing scientific paper, including work report that is in line with scientific procedure based on the analysis, information, and data, and the ability to interpret and communicate in an accurate and accountable manner in order to solve problems and phenomena related to the occupation.
	CO3.1	Understand the problems in the electric power system
	CO3.2	Understand the problems in loading plants
	CO3.3	Understand the process of frequency regulation in the operation of power plants
	CO3.4	Understand the determination of voltage and reactive power settings in plant operation
Course outcomes:	CO3.5	Understand the determination of the power generated in thermal plants to operate economically
	CO3.6	Understand the operating constraints on the electric power system
	CO3.7	Understand the stability of generators operating in synchronous systems
	CO4	Facilitate, assess, and implement the learning process and learning results in a professional manner, as well as building community partnership in the scope of vocational education in conducting duties of the teacher profession
	CO4.1	Communicating problems in the electric power system
	CO4.2	Explain the problem in loading plants
	CO4.3	Explain the process of regulating the frequency in the operation of power plants
	CO4.4	Explain the determination of voltage regulation and reactive power in the operation of generators

	CO4.5 Explain the determination of the power generated thermal plants to operate economically						
	CO4.6 Explain the operating constraints on the electric power system						
	CO4.7 Determine the stability of the power plant that operates in the electric power system						
	CO5						
		ELO1	ELO3	ELO5	ELO6	ELO9	
	CO1	✓					
	CO2		✓				
ELO and CO mapping	CO3			✓			
	CO4				✓		
	CO5					✓	
Courses Description:	introduction to the electric power system, the imposition of generating units, frequency regulation, economic operations in thermal plants, constraints and disturbances in the operation of the electric power system, implementation and control of electric power system operations, voltage regulation and reactive power allocation, analysis and evaluating the operation of the electric power system						
Assesments:	reactive power allocation, analysis and evaluating the operation						

	No	СО	Assessment Objec	t Assessment Technique	Weight		
	1	CO1	Assessment of attitud presence, discipline, activeness	e, Observation	10%		
	2	CO2	Presentation and practice results	Observation	10%		
	3	CO3, CO4,	a. Individual assignments	Individual Practice Test	10%		
		and CO5	b. Group assignments and Group practice	(adapts to the technique used)	10%		
			c. Midterm exam		20%		
			d. Final exams		40%		
				Total	100%		
Forms of media:	Boar	d, LCD F	Projector, Laptop/Co	omputer			
		Sukisno, Listrik	Toto. (2012). Han	dout Operasi Sis	tem Tenaga		
	2. Stevenson, William D. (1984). <i>Analisis Sistem Tenaga Listrik</i> . Jakarta. Penerbit Erlangga						
Literature:	<ol> <li>Marsudi, Djiteng. (2006). Operasi Sistem Tenaga Listrik. Yogyakarta: Penerbit Graha Ilmu</li> </ol>						
	<ol> <li>J.Wood (1984). Power Generation, Operation, and Contro John Wiley and Sons.</li> </ol>						
	5. Sadat, Hadi. (1999). <i>Power System Analysis</i> . Singapore: McGraw-Hill.						
Date of revision	10 A	ugust 20	18				



FACULTY OF ENGINEERING DEPARTMENT OF ELECTRICAL ENGINEERING EDUCATION Jalan Colombo Nomor 1 Yogyakarta 55281 Telephone (0274) 586168 ext 276,289,292 , (0274) 586734 , Fax (0274) 586734 Web:ft.uny.ac.id, E-mail: <u>elektro@uny.ac.id</u>

# Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Industrial Automation System Design Lab Work
Module level, if applicable:	Undergraduate
Code:	EKO6252
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	6 <sup>th</sup>
Module coordinator:	Sunomo, M. T.
Lecturer(s):	1. Ariadie Chandra Nugraha, M.T.
	2. Dr. Haryanto, M.Pd.,M.T.
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/Elective Course
Teaching format / class hours per week during the semester:	200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week.
Teaching and Learning Method	Tutoial, Task, Demonstration.
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-
Expected Learning	After taking this course the students have ability to:
Outcomes:	ELO1 Demonstrate piousness to God, high loyalty to academic values, norms, and ethics
	ELO3 Capable to perform professional works in his/her field of expertise both individual and team works

	<ul> <li>ELO4 Master in basic sciences and principles of electric</li> <li>ELO7 Capable to manage vocational education and training of electrical engineering expertise by utilizing information and communications technology</li> </ul>							
Course Outcomes:	CO1 Devoted to God Almighty and able to show a regius attitude and character,							
		udents are abl rdware,	e to build a s	ystem based	d electronic			
		udents are able ectronic hardwa		a system ba	sed			
ELO and CO mapping:		ELO1	ELO3	ELO4	ELO7			
	CO1	✓						
	CO2	✓						
	CO3		✓					
	CO4		✓	✓				
	CO5		✓	✓	✓			
Courses Description:	The material in this course is a combination of applications from various basic sciences, such as electricity, analog and digital electronics, power electronics, control systems, mechanical technology, programming, information technology, microcontrollers and robotics. In this course, students are required to make hardware technology work. In the early weeks, students are assigned by the instructor to search for works that have been made by students in the same field of study, and analyzed to find out whether the work can be developed, modified, or improved so that the performance can be used as the title of the device hard to be made as an assignment in this course. By making hardware that is demanded, it is expected that students will truly have competence in soldering techniques, techniques of assembling electronic devices, techniques of making printed strand boards (circuits), and repair techniques (trouble shooting) if the equipment fails to work.							
Assessments:								

	<ul> <li>attitude. The student is given a value of a very go attitude or not good if it shows significantly better or le good attitude compared to the attitude of students general. Attitude assessment also considers t activeness of students following lectures.</li> <li>2. Final grades include the results of the attitude, knowled and skills assessment obtained from individu assignments, group assignments, presentations, quizze Midterm Examinations, and Final Semester Exams w the following guidelines.</li> </ul>						
	No	СО	Assessment Object	Assessment Technique	Weight		
	1	CO1- CO5	Individual Assignment	Practicum report	10%		
			Group Assignment	Practicum	20%		
			Mid	Written test	25%		
			Final Exam	competence test	40%		
			Attendance	Documentation	5%		
				Total	100%		
Forms of media:	Boar	d, LCD P	Projector, Laptop/Compu	ıter			
Literature:	<ol> <li>Board, LCD Projector, Laptop/Computer</li> <li>Ogata, Katsuhiko, 1995, Teknik Kontrol Automatik, Erlangga.</li> <li>Andrianto, Heri. (2008). Pemrograman Mikrokontroler AVR ATMEGA 16 menggunakan Bahasa C (CodeVision AVR). Bandung: Informatika.</li> <li>Lingga Wardana, 2006, Belajar Sendiri Mikrokontroler AVR Seri ATMega 8535. Yogyakarta: Andi.</li> <li>Rachmad Setiawan, 2006, <i>Mikrokontroler MCS51</i>, Graha Ilmu.</li> <li>Houpis, C.H., &amp; Lamont, G.B. (1992). Digital control systems theory, hardware, software. (2nd Ed.). New York: McGraw Hill, Inc.</li> </ol>						
Date of revision	17 A	ugust 20 <sup>-</sup>	18				



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# Bachelor of Education in Electrical Engineering Study Program (B.Ed.Electrical SP)

Module name:	Pneumatics Lab Work
Module level, if applicable:	Undergraduate
Code:	EKO6253
Sub-heading,if applicable:	-
Classes,if applicable:	-
Semester:	6 <sup>th</sup>
Module coordinator:	Totok Heru Trimaryadi, M. Pd.
Lecturer(s):	1. Amelia Fauziah Husna, M.Pd.
Language:	Bahasa Indonesia
Classification within the curriculum:	Compulsory/Elective Course
Teaching format / class hours per week during the semester:	200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week.
Teaching and Learning Method	Demonstration, Lecture, Discussion, Task, Practice.
Workload:	Total workload is 181 hours per semester which consists of 200 minutes lectures, 240 minutes structured activities, and 240 minutes self-study per week for 16 weeks.
Credit points:	2
Prerequisites course(s):	-
Expected Learning Outcomes:	<ul> <li>After taking this course the students have ability to:</li> <li>ELO1 Demonstrates devotion to YME God, the practice of values, norms, and academic ethics</li> <li>ELO3 Can carry out work in accordance with the professional field of expertise both individually and in teams</li> </ul>

	ir e ELO6 <i>A</i> fi ELO9 <i>A</i>	Mastering work standards, work methods, work nplementation, and testing in the field of electric power ongineering or industrial automation. Able to plan, implement, and evaluate learning in the eld of electric power or automation Able to develop innovations in education, and publish he results of his work
Course Outcomes	CO1	Fear God Almighty and be able to show a religious attitude, honest and patient
	CO2	Demonstrates responsibility for work in their area of expertise independently.
	CO3	Knowledge of the preparation of scientific works including work reports in accordance with scientific procedures based on data and information analysis.
	CO3.1	Understanding pneumatic and electrop pneumatic components
	CO3.2	Understand pneumatic and electropneatic component symbols according to international standards
	CO4	Facilitating, evaluating, implementing learning and learning outcomes in a professional manner, as well as community partnerships within the framework of vocational education in carrying out duties as a teaching profession
	CO4.1	Assembling a basic set of single actuators
	CO4.2	Arranging a basic series of plural actuators
	CO4.3	Designing pneumatic based control systems
	CO4.4	Designing an electrop pneumatic based control system
	CO5	Apply logical, critical, systematic, and innovative thinking in the context of developing or implementing science and / or technology in accordance with their area of expertise

ELO and CO mapping								
		ELC	D1	ELO3	ELO5	ELO6	ELO9	
	CO1	✓						
	CO2			✓				
	CO3				✓			
	CO4					✓		
	CO5						$\checkmark$	
Courses Description:	Pneumatic Practice Course is a course that discusses and applies about: 1) pneumatic and electrop pneumatic components, 2) pneumatic and electrop pneumatic component symbols, 3) how pneumatic and electrop pneumatic components work, 4) calculation of compressive strength on pistons, 5) direct and indirect pneumatic and electropneatic circuits, 6) pneumatic and electropneatic circuits of single and plural actuators, and 7) variations of various pneumatic and electropneatic circuits for 2 actuators.							
Assessments:	achie (CO and 2. Attitu obse assu The good com of th stud requ least cons 3. Fina know indiv Inse follov	evemer 1 and 0 special ude ass ervation studen studen d if it s pared to ent's fir iremen thave iders the l grade vledge, idual rtion Ex wing gu	nts, r CO 2 skills sessr tech that g hows o the ude a hal g ts. S gen assig ams udelin will b	namely att ), general s (CO 6). ment is can iniques an basically e iven a value s significar attitude of assessmen rade, but tudents wi good attitue tiveness of clude the eral skills, gnments, , and Final	ainment skills (CC rried out d / or self very stud ue of a vently better students ather as ll graduat de. Attit f students results and spec group a Semeste	o measure a learning ach 4), knowled at each mea -assessmen ent has a goo ry good attit or less goo in general. T t a compon one of the e from this c ude assess following le of an asse ial skills obta ssignments, r Examinatio	ievements ge (CO 5), eting using t using the od attitude. ude or not od attitude The results ent of the graduation ourse if at ment also ctures. ssment of ained from quizzes,	
				Object		Technique		
	a	O1 nd O2		ude liness of the ussion		Observation	10%	

	K.1.2.2, S.1.4.1, S.1.4.2,assignments assignments assignments S.1.4.2, S.1.4.3, S.1.4.3, C. Quiz S.1.4.4, G.2.1program results b. Presentation c. WritenK.1.2.2, assignments S.1.4.2, S.1.4.3, G.2.1b. Group assignments c. Writen	10% 10% 20% 40%
Forms of media:	Board, LCD Projector, Laptop/Computer	
Literature:	<ol> <li>Croser, P., 1989. Pneumatics : Basic Level TP 101. Didactic KG, D-7300 Esslingen 1.</li> <li>Croser, P., 1994. Pneumatik. Festo Didactic. Penyu Budi Hartanto.</li> <li>Patient, P., Pickup, R., dan Powell, N., 1985, Pen Ilmu Teknik Pneumatika., Alih bahasa: W A.T.K., Jakarta: PT.Gramedia</li> <li>Sugihartono, 1985, Dasar-dasar Kontrol Pnematik, T Bandung.</li> <li>Suyanto, 2000, Pengantar Sistem Pneumatik, Ju Pendidikan Teknik Mesin dan Teknik Mesin, Unive Negeri Yogyakarta.</li> <li>Werner, H., 1993. Pneumatics: Book of Exercise Solutions. Festo Didactic KG, D73734 Esslingen.</li> </ol>	runting: ngantar Vidodo, Γarsito, urusan rersitas
Date of revision	30 August 2018	

