



CURRICULUM 2014

STUDY PROGRAM

BACHELOR OF EDUCATION
IN ELECTRICAL ENGINEERING (S1)

DEPARTMENT OF ELECTRICAL ENGINEERING EDUCATION
FACULTY OF ENGINEERING
UNIVERSITAS NEGERI YOGYAKARTA
2018



**CURRICULUM 2014
Bachelor of Education
in Electrical Engineering
Program Study**

**FACULTY OF ENGINEERING
UNIVERSITAS NEGERI YOGYAKARTA
2018**

PREFACE

Alhamdulillah Robbil 'alamiin, all gratitude to Allah SWT, Almighty God for His grace and guidance so the curriculum of the Study Programs in the Faculty of Engineering of Universitas Negeri Yogyakarta can be completed. This curriculum is a competency-based curriculum that refers to the Indonesian National Qualification Framework (INQF). The curriculum was developed by considering the rapid development of science and technology and the updated paradigm of education as well as the Government's Policy on the Indonesian National Qualification Framework (INQF).

This book covers the curriculum of 17 Study Programs in the Faculty of Engineering of Universitas Negeri Yogyakarta that consists of 9 Study Programs of Engineering Education (S1) and 8 Study Programs of Vocational (D3), namely: 1) Study Program of Electrical Engineering Education, 2) Study Program of Electronic Engineering Education, 3) Study Program of Mechanical Engineering Education, 4) Study Program of Automotive Engineering Education, 5) Study Program of Civil and Planning Engineering Education, 6) Study Program of Culinary Education, 7) Study Program of Fashion Design Engineering Education, 8) Study Program of Mechatronics Engineering Education 9) Study Program of Informatics Engineering Education, 10) Study Program of Electrical Engineering, 11) Study Program of Electronic Engineering, 12) Study Program of Mechanical Engineering, 13) Study Program of Automotive Engineering, 14) Study Program of Civil Engineering, 15)

Study Program of Culinary Engineering, 16) Study Program of Fashion Design Engineering, 17) Study Program of Cosmetology.

By using this curriculum, all related parties may expect to comprehend and conduct the learning and assessment process based on the 2014th competency-based curriculum referring to the Indonesian National Qualification Framework (INQF) in order to produce graduates who are competent in the respective fields in a timely manner.

Yogyakarta, 6 August 2018

Dean

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PART I INTRODUCTION

A. BACKGROUND

The Faculty of Engineering of Universitas Negeri Yogyakarta (FoE UNY) is a part of higher education institutions that has the task of carrying out the three pillars of higher education, namely conducting education and teaching, research, and community service. In the field of education and teaching, FoE UNY organizes two lines of educational programs namely the academic field for Strata 1 (S1) and the vocational field for diploma 3 (D3). As a consequence, FoE UNY has a dual-task, which is to prepare the academic and vocational workforce in the technical and vocational fields which need to be managed in an integrated and synergistic manner.

The rapid development of science and technology should be anticipated by educational institutions to prepare students and graduates to get into the workforce that is designed on the curriculum. Government Regulation No. 17 of 2010 Article 97 mandates that the curriculum of higher education developed and implemented should be based on competency. Based on the Regulation of Ministry of Education and Culture No. 049 of 2014 concerning the National Higher Education Standards and the establishment of the Indonesian National Qualification Framework (INQF) by the government through Presidential Regulation No. 8 of 2012 as a reference in preparing the learning outcomes of graduates

from each level of education nationally, educational institutions need to conduct studies and curriculum development used. Referring to this legal basis, the Study Program at the Faculty of Engineering of Universitas Negeri Yogyakarta needs to review the curriculum used to adapt to the development of science and technology in order to produce a better curriculum.

The development of Study Program curriculum in the Faculty of Engineering of Universitas Negeri Yogyakarta is carried out through the systematic stages starting from 1) analysis of self-evaluation and tracer study by involving stakeholders, 2) formulation of Graduates Profile by involving other similar Study Programs in the public LPTK in Indonesia, 4) arrangement of Learning Achievements, 5) assessment of Study Materials, 6) preparation of Subjects Matter 6) preparation of Curriculum Structure, 7) preparation of Learning Plans and arrangement of curriculum.

The 2014th curriculum is expected to improve the quality of learning in all Study Programs of Faculty of Engineering of Universitas Negeri Yogyakarta that can produce graduates with a high GPA, on-time and competent in their fields.

B. BASIS

1. JURIDICAL BASIS

- a. Regulation of Ministry of Culture and Education No. 049 of 2014, concerning National Standards of Higher Education.
- b. Law Number 20 of 2003, concerning the National Education System

- c. Law Number 14 of 2005 concerning Teachers and Lecturers
- d. Law No. 12 of 2012 on Higher Education
- e. Regulation of the President of Republic of Indonesia Number 8 of 2012 concerning the Indonesian National Qualification Framework (INQF)
- f. Regulation Number 19 of 2005 concerning National Education Standards
- g. Regulation Number 74 of 2008 concerning Teachers
- h. Regulation Number 17 of 2010 concerning Management and Implementation of Education
- i. Regulation of the President of Republic of Indonesia No. 8 of 2012 concerning the Indonesian National Qualification Framework (INQF)
- j. Regulation of Ministry of National Education Number 16 of 2007 concerning Academic Qualification Standards and Teacher Competencies
- k. Regulation of Ministry of National Education No. 27/2008 concerning Academic Qualification Standards and Counselor Competencies
- l. Regulation of the Ministry of Administrative and Bureaucratic Reform Number 16 of 2009 concerning Teacher Functional Position and Credit Scores.

2. PHILOSOPHICAL BASIS

The development of the study program curriculum at the Faculty of Engineering of UNY is based on various philosophies such as

humanism, essentialism, idealism, pragmatism, and progressivism with the following thoughts.

- a. Indonesian people as God's creatures have a good divine nature; able to learn and practice to gain knowledge, skills, and to shape smart, intellectual, and independent attitudes.
- b. Education develops a good Indonesian people who are Pancasila: devoted to God Almighty, humane, dignified, democratic, and upholding social values.
- c. Education equips students with progressive knowledge, skills, and attitudes so they can exist and prosper in their lives.
- d. Technical education pays attention to the characteristics and needs of students, the needs of society, the advancement of science and technology, and the culture of the Indonesian nation.
- e. Educators have personal, social, pedagogical, and professional competencies that are appropriate to their scientific fields and work professionally with the principles of worship, *ing ngarso sung tuladha*, *ing madya mangun karsa*, and *tut wuri handayani*.
- f. Educational institutions are a system that is independent, authoritative, and full of responsibility for the intellectual life of the nation.

3. THEORETICAL BASIS

The development of the study program curriculum at the Faculty of Engineering UNY is based on the knowledge and principles of curriculum development as follows.

- a. Relevance; the curriculum and learning process must be relevant to the development of science and technology, community needs, and up-to-date.
- b. Flexibility; the curriculum should have both horizontal and vertical flexibility in terms of content and the implementation process.
- c. Effectiveness and efficiency; the curriculum is designed to be able to run effectively and efficiently in its implementation to achieve pre-determined learning outcomes.

C. VISION DAN MISSION OF FACULTY OF ENGINEERING

1. VISION

Long-term:

In 2025, it will become an excellent Faculty in the field of technology and vocational education based on faithfulness independence, and intellectuality.

Medium Term (2014 - 2018):

Producing the bachelor of education and diploma in the fields of technology and professional vocational based on faithfulness independence, and intellectuality in accordance with the demands of the development of science and technology in the global era.

2. MISION

- a. Organizing academic, professional and vocational education in the field of technology and vocational education supported by vocational fields to produce superior graduates based on faithfulness independence, and intellectuality.
- b. Carrying out basic and applied research in the field of education and vocational.
- c. Carry out community service and empowerment activities that encourage the development of community and environmental potential to realize community welfare.
- d. Organizing good, clean, and accountable faculty governance.
- e. Developing various resources and cooperation to support the achievement of the vision of the Faculty of Engineering.

D. CURRICULUM DEVELOPMENT STAGE

In general, the stages of compiling the Study Program curriculum at the Faculty of Engineering of Universitas Negeri Yogyakarta are carried out through the following stages:

1. Analysis of self-evaluation of each Study Program conducted by a self-evaluation team that conducts an analysis of strengths, weaknesses, opportunities, and threats. In line with the self-evaluation analysis, the Study Program also conducts tracer studies to see how the role of graduates in the workforce. This is

done through workshops, seminars, and other activities that involve alumni, professional associations, business and industry as well as other relevant parties.

2. From the self-evaluation material, tracer study and input from various related parties, a graduate profile is then drawn up that reflects the role of graduates after entering the workforce. The formulation of graduate profiles is also carried out by discussions with similar study programs in public LPTKs throughout Indonesia.
3. The results of the formulation of this graduate profile are then formulated the earning outcomes to build the required competencies that are adjusted to the level of the Indonesian National Qualification Framework (INQF). S1 graduates of Technical Education are adjusted to level 6 at INQF, while D3 Engineering graduates are adjusted to level 5 of INQF. The formulation of learning outcomes is carried out by the curriculum development team in each study program which is then socialized and discussed in the Study Program meeting forum.
4. After the learning outcomes formulated, a study of the materials needed for learning is then carried out. This study material is adjusted to the appropriate learning outcomes to train students and graduates in accordance with pre-determined roles related to the abilities of cognitive, skills, and attitude.
5. The next step is to compile a list of courses in accordance with the specified learning outcomes. This is related to the depth and

breadth of the material to be delivered as well as a brief description for each course.

6. The next stage is to arrange curriculum structure per semester, so the curriculum structure can be more easily understood by students, lecturers, and related parties.
7. The next stage is preparing, documenting the curriculum in the form of curriculum books that are printed in one Department in accordance with their respective fields of expertise.

In brief, the stages of curriculum preparation for the Study Program at the Faculty of Engineering of Universitas Negeri Yogyakarta can be seen in Figure 1.

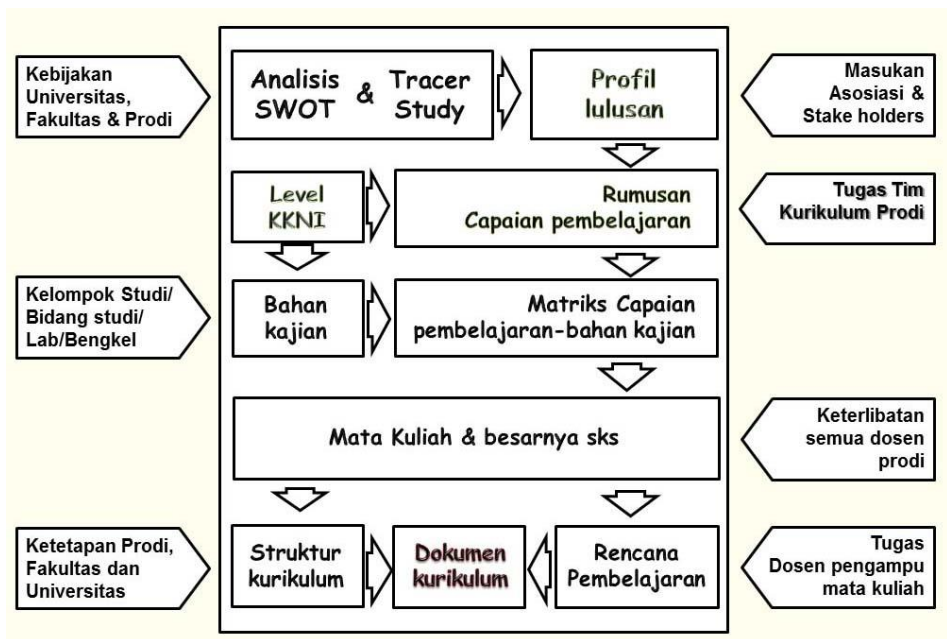


Figure 1. Stage of curriculum development

PART II

STUDY PROGRAM CURRICULUM

BACHELOR OF EDUCATION IN ELECTRICAL ENGINEERING

A. VISION

In 2025 to become an excellent and internationally competitive Electrical Engineering Education Study Program that produces educators who are pious, independent, intellectual and adaptive to the development of Science, Technology, and Art.

B. MISSION

Considering all aspects and various local, national and international issues, the mission of Bachelor of Education in Electrical Engineering Study Program was formulated as follows.

- a. Administering an excellent electrical engineering education,
- b. Preparing qualified and competent electrical engineering
- c. Developing an electrical engineering education system through research cooperation with stakeholders.

C. STUDY PROGRAM PROFILE

The specification summary of Bachelor of Education in Electrical Engineering Study Program (B.Ed. Electrical SP) is presented as follow.

Awarding Institution	Universitas Negeri Yogyakarta
Programme Title	Bachelor of Education in Electrical Engineering Study Program (B.Ed. Electrical SP)
Degree awarded	Sarjana Pendidikan (S.Pd.)

Criteria for Admission	High school completion		
Mode of Study (Full-time, Part-time, others)	Full time	Framework for Higher Education Qualification Level	Level 6
Length of programme	Four Years	Minimum Credits for Programme	147 credits
Year of programme establishment	1964		
Faculty	Faculty of Engineering		
Department	Education in Electrical Engineering		
Accreditation	A with total score 372 (out of 400) by National Accreditation Board of Higher Education (BAN-PT) No. 1133/SK/BAN-PT/Akred/S/X/2015 for the period of October 31 st 2015 to October 31 st 2020		
Date of Reaccreditation	1 st November 2020		
Contact	Jalan Colombo No. 1, Kota Yogyakarta, Daerah Istimewa Yogyakarta, Republic of Indonesia, postcode: 55281 Phone: +62-274-586-168 ext. 293, +62-274-548-161 Fax: +62-274-5867-34 E-mail: elektro@uny.ac.id Website: http://ptelektro.ft.uny.ac.id/		

D. GRADUATE PROFILES

- a. Electrical Engineering Educator in Vocational High Schools.
- b. Electrical engineering instructors in industry, educational and training institutions (Diklat) and Non-School Education.
- c. Educational staff in electrical engineering.

- d. Industrial technicians in electrical engineering.
- e. Laboratory Staff in electrical engineering.

E. LEARNING OUTCOMES

Learning outcomes or competencies of graduates of the Bachelor of Education in Electrical Engineering Study Program are derived from the graduate profiles. The curriculum development team developed the graduates' competencies based on input from alumni, industry and professional associations,

In accordance with the ideology of the State and culture of the Indonesian Nation and in accordance with the qualification level of Indonesian National Qualification Framework (INQF) Level 6, the implementation of the national education system carried out in the Electrical Engineering Education Study Program (S1) includes processes that foster attitudes, knowledge, special skills and general skills. Expected Learning Outcomes (ELO) of Bachelor of Education in Electrical Engineering Study Program consists of 9 units as follows.

1. Demonstrate devotion to God, practice the values, norms, and academic ethics
2. Demonstrate an attitude of nationalism, responsibility, and tolerance towards society and the environment
3. Can carry out work in accordance with the professional field of expertise both individually and in teams
4. Mastering basic science and basic electricity

5. Mastering work standards, work methods, work implementation, and testing in the field of electric power engineering or industrial automation
6. Able to plan, implement, and evaluate learning in the field of electric power or automation
7. Able to manage vocational education and training in the field of Electrical Engineering by utilizing information and communication technology
8. Able to apply research methods and preparation of scientific works
9. Able to develop innovations in education, and publish the results of his work.

The ELOs above can be broken down into 46 Sub-ELOs which can be seen in the table below:

Attitude

ELO Code	ELO Description	Sub-ELO Code	Sub-ELO Description
ELO 1 (A.1)	Demonstrate piousness to God, high loyalty to academic values, norms, and ethics.	A.1.1	Being pious to God Almighty and able to demonstrate religiousness, honesty, and patience
		A.1.2	Upholding humanity values in conducting duties based on religion, moral, and ethics.
		A.1.3	Embodying academic values, norms, and ethics.

ELO Code	ELO Description	Sub-ELO Code	Sub-ELO Description
ELO 2 (A.2)	Demonstrate nationalism, responsibility, and tolerance to both society and environment.	A.2.1	Playing a role as a citizen who loves and is proud of the nation with a sense of nationalism and responsibility to the state and nation.
		A.2.2	Obeying the law and discipline in the life in the community and state.
		A.2.3	Respecting the diverse cultures, views, religions and beliefs, as well as opinions or original invention of others.
		A.2.4	Contributing to the improvement of the quality of life in the community, the nation, the state, and the advancement of civilization based on Pancasila.
		A.2.5	Working together and having the social sensibility as well as caring on the people and environment.
ELO 3 (A.3)	Capable to perform professional works in his/her field of expertise both individual and team works.	A.3.1	Embody the spirit of independence, struggle, and entrepreneurship.
		A.3.2	Demonstrating responsibility on the respective profession of expertise in an independent manner.
		A.3.3	Develop and maintain professional network with advisors, colleagues, and peers whether in or outside the institution.

Knowledge

ELO Code	ELO Description	Sub-ELO Code	Sub-ELO Description
ELO 4 (K.1)	Master in basic sciences and principles of electricity	K.1.1	Knowledge on the principles of Mathematics and Physics in relation to the principles of electrical power
		K.1.2	Knowledge on the law and basic theories of electricity.
ELO 5 (K.2)	Master in work standards, work methods, work implementations, and testing in electric power or industrial automation expertise.	K.2.1	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.

Special skill

ELO Code	ELO Description	Sub-ELO Code	Sub-ELO Description
ELO 6 (S.1)	Capable to make plans, implement, and evaluate learning in electric power or industrial automation expertise	S.1.1	Apply education management at school and training institution in the field of electrical engineering
		S.1.2	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
		S.1.3	Apply information and communication technology in

ELO Code	ELO Description	Sub-ELO Code	Sub-ELO Description
			conducting duties as instructor and educational staff
		S.1.4	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
ELO 7 (S.2)	Capable to make plans, implement, and evaluate learning in electric power or industrial automation expertise	S.2.1	Knowledge on the design, analysis, and application of measuring system in relation to the quantity and quality of electrical power engineering or industrial automation.
		S.2.2	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.
		S.2.3	Deciding the materials for design purposes and installation in relation to electrical power engineering or industrial automation.
		S.2.4	Knowledge on the safety system of electrical power engineering for the safety of the equipment, as well as the safety and health of the users.

ELO Code	ELO Description	Sub-ELO Code	Sub-ELO Description
		S.2.5	Knowledge on identifying, formulating, and solving the control system in the electrical power engineering or industrial automation
		S.2.6	Analyze and solve regular technical problems in relation to electrical power engineering by applying the principles of mathematics, physics, and chemistry
		S.2.7	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.
		S.2.8	Apply new technologies to design, analyze, and apply measuring system in relation to the quality and quantity of electrical power engineering or industrial automation to fulfill the needs of the society in a professional and ethical manner.
		S.2.9	Perform an analysis in relation to the material application in relation to electrical power engineering or industrial automation for the development of renewable energy regeneration
		S.2.10	Have full understanding on the general theory of electrical power plant and energy efficiency.

ELO Code	ELO Description	Sub-ELO Code	Sub-ELO Description
		S.2.11	Apply the applied standards in electrical power or industrial automation system (PUIL, IEC, IEEE and other standards)
		S.2.12	Have full understanding and mastery on the transmission theory and electrical power distribution.
		S.2.13	Apply measuring theory and electrical parameter measuring equipment.
		S.2.14	Apply electrical theories (single line diagram, wiring diagram, the laws of electricity, and electrical circuit).
		S.2.15	Have full mastery and applying electrical installation engineering for commercial and industrial purposes of one or three phases.
		S.2.16	Have full mastery on the concept of electrical power quality and how to conduct repairmen of electrical power profile.
		S.2.17	Have full mastery of automation engineering for electrical power and renewable energy (magnetic contactor, electronic power PLC and microcontroller);
		S.2.18	Have full mastery and apply maintenance and repairmen methods for electrical power or industrial automation system.

ELO Code	ELO Description	Sub-ELO Code	Sub-ELO Description
		S.2.19	Apply electrical power engineering safety system for safety of the equipment as well as user health and safety.

General Skill

ELO Code	ELO Description	Sub-ELO Code	Sub-ELO Description
ELO 8 (G.1.)	Capable to apply research and scientific writing methods	G.1.1	Implement strategies, media, learning materials, and learning assessment on technology and vocational education in the field of electrical engineering
		G.1.2	Apply innovative learning models that are relevant with the characteristics of the students.
		G.1.3	Manage independent learning.
		G.1.4	Knowledge on pedagogical and didactical concepts in preparing the lesson plan of technology and vocational education in the field of electrical engineering.
		G.1.5	Knowledge on the concept of learning strategy development, and learning media of technology and vocational education in the field of electrical engineering.
ELO 9 (G.2)	Capable to develop a vocational	G.2.1	Apply logical, critical, systematic, and innovative thinking in the context of knowledge and/or technology

ELO Code	ELO Description	Sub-ELO Code	Sub-ELO Description
	education innovation and publish scientific paper		development or implementation based on the respective field.
		G.2.2	Study the implications of the development or implementation of knowledge, technology and art based on the respective field according to the scientific principles, procedure and ethics to generate solutions, ideas, designs or art criticisms, in addition to developing scientific descriptions of the result of the study in the form of thesis or final assignment report.
		G.2.3	Make decisions in an accurate manner in the context of problem- solving in the respective field based on the analysis on information and data.
		G.2.4	Develop scientific paper report that meets the scientific procedure based on analysis information and data, as well as interpret and communicate in an accurate and accountable manner to solve problems and issues related to the occupation

F. CURRICULUM STRUCTURE

No	Code	Courses	Credit				Ket
			T	P	L	J	
1st Semester							
1	MKU6301	Islamic Studies*	3			3	Minimal B
	MKU6302	Catholic Studies *					
	MKU6303	Christian Studies *					
	MKU6304	Buddhism Studies *					
	MKU6305	Hinduism Studies *					
	MKU6306	Confucianism Studies *					
2	MDK6201	Science of Education	2			2	Min. C
3	KTF6205	Mathematics	2			2	
4	KTF6206	Physics	2			2	
5	EKO6201	Fundamentals of Electrical	2			2	
6	EKO6202	Electronics	2			2	
7	EKO6303	Digital Engineering Laboratory Work		3		3	
8	EKO6204	Computer Programming Laboratory Work		2		2	
9	EKO6205	Engineering Drawing Laboratory Work		2		2	
10	EKO6206	Mechanical Technology Laboratory Work		2		2	
11	MKU6211	English	2			2	
Total Credits 1st Semester			15	9	0	24	
2nd Semester							
12	MKU6208	Pancasila	2			2	Min. C
13	MDK6203	Education Management	2		1	3	Min. C

No	Code	Courses	Credit				Ket
			T	P	L	J	
14	EKO6307	Mathematics Engineering	3			3	
15	EKO6308	Electrical Circuit	3			3	
16	EKO6209	Electronics Practices		2		2	
17	EKO6210	Basic Electrical Practices		2		2	
18	EKO6211	Control System	2			2	
19	EKO6212	Computer Network		2		2	
20	EKO6213	Microprocessor System	2			2	
21	EKO6314	Electrical Machine	3			3	
		Total Credits 2nd Semester	17	6	1	24	
3rd Semester							
22	MKU6207	Civic Education	2			2	Min. C
23	MDK6202	Educational Psychology	2			2	Min. C
24	EKO6215	Control Systems Laboratory Work		2		2	
25	EKO6216	Microprocessor Systems Laboratory Work		2		2	
26	EKO6217	Electrical Circuit Laboratory Work		2		2	
27	EKO6218	Electric Machinery Laboratory Work		2		2	
28	EKO6219	Power Electronics	2			2	
29	EKO6220	Commercial Electricity Installation	2			2	
30	EKO6221	Commercial Electricity Installation Lab. Work		2		2	
31	KTF6207	Occupation Health and Safety	2			2	
32	MDK6204	Educational Socio-anthropology	2			2	Min. C
		Total Credits 3rd Semester	12	10	0	22	

No	Code	Courses	Credit				Ket
			T	P	L	J	
4th Semester							
Power Engineering							
33	KTF6208	Technology and Vocational Education	2			2	
34	EKO6222	Power Electronics Laboratory Work		2		2	
35	EKO6223	Electricity Installation Design**	2			2	
36	EKO6224	Electricity Installation Design Laboratory Work**		2		2	
37	MKU6210	Statistics	2			2	Min. C
38	EKO6225	Electrical Power Protection		2		2	
39	EKO6327	Programmable Logic Controller Lab. Work		3		3	
40	EKO6228	Industrial Electricity Installation	2			2	
41	EKO6229	Industrial Electricity Installation Lab. Work		2		2	
42	EKO6230	Industrial Management	2			2	
43	EKO6231	Electrical Power System Analysis**	2			2	
44	MDK6205	Counselling Guidance**	2				
		Total Credits 4th Semester	14	11	0	23	
Industrial Automation							
33	KTF6208	Technology and Vocational Education	2			2	
34	EKO6222	Power Electronics Laboratory Work		2		2	
45	EKO6233	Robotics**	2			2	
46	EKO6234	Industrial Automation Engineer-		2		2	

No	Code	Courses	Credit				Ket
			T	P	L	J	
		ing Work**					
37	EKO6225	Electrical Power Protection	2			2	
38	MKU6210	Statistics	2			2	Min. C
39	EKO6327	Programmable Logic Controller Lab. Work		3		3	
40	EKO6228	Industrial Electricity Installation	2			2	
41	EKO6229	Industrial Electricity Installation Lab. Work		2		2	
42	EKO6230	Industrial Management	2			2	
47	EKO6235	Intelligent Control Systems**	2			2	
44	MDK6205	Counselling Guidance**	2				
		Total Credits 4th Semester	16	9	0	23	
5th Semester							
Power Engineering							
48	KTF6203	Instructional Media	2			2	
49	KTF6201	Curriculum & Instructional of Vocational	2			2	
50	EKO6226	Electrical Power Protection Lab. Work		2		2	
51	KTF6202	Vocational Instructional Strategic	2			2	
52	KTF6204	Vocational Learning Assessment	2			2	
53	KTF6309	Industrial Internship			3	3	Min. C
54	EKO6336	Education Multimedia Design Lab. Work		3		3	
55	EKO6237	Transmission and Distribution	2			2	
56	EKO6238	Electrical Maintenance and Services Lab. Work		2		2	

No	Code	Courses	Credit				Ket
			T	P	L	J	
57	EKO6239	Energy Management		2		2	
58	EKO6240	Electrical power System Simulation Lab. Work**		2			
59	EKO6241	Laboratory Management**	2				
60	EKO6254	Professional Ethics**	2				
		Total Credits 5th Semester	14	11	3	22	
Industrial Automation							
48	KTF6203	Instructional Media	2			2	
49	KTF6201	Curriculum & Instructional of Vocational	2			2	
50	EKO6226	Electrical Power Protection Lab. Work		2		2	
51	KTF6202	Vocational Instructional Strategic	2			2	
52	KTF6204	Vocational Learning Assessment	2			2	
53	KTF6309	Industrial Internship			3	3	Min. C
54	EKO6336	Education Multimedia Design Lab. Work		3		3	
55	EKO6237	Transmission and Distribution	2			2	
56	EKO6238	Electrical Maintenance and Services Lab. Work		2		2	
61	EKO6242	Interfacing Laboratory Work**		2		2	
62	EKO6243	Sensor and Transducer Lab. Work**		2			
63	EKO6244	Digital Control**	2				
60	EKO6254	Professional Ethics**	2				
		Total Credits 5th Semester	14	11	3	22	
6th Semester							

No	Code	Courses	Credit				Ket
			T	P	L	J	
Power Engineering							
64	MKU6214	Sociocultural Education	2			2	Min. C
65	MKP6301	Education Research Method	3			3	
66	MKU6212	Entrepreneurship	2			2	Min. C
67	MKU6209	Indonesian Language	2			2	Min. C
68	EKO6245	Transmission and Distribution Lab. Work		2		2	
69	EKO6246	Micro Teaching		2	1	3	Min. B
70	EKO6247	Electrical Power Plant	2				
71	EKO6248	Electrical Power Plant Lab. Work		2		2	
72	KTF6210	Vocational Guidance	2			2	
73	EKO6255	Flexible Manufacturing System Lab. Work**		2			
74	EKO6250	Refrigerant and Air Conditioning Lab Work**		2		2	
75	EKO6251	Electrical Power System Operation**	2				
		Total Credits 6th Semester	15	10	1	20	
Industrial Automation							
64	MKU6214	Sociocultural Education	2			2	Min. C
65	MKP6301	Education Research Method	3			3	
66	MKU6212	Entrepreneurship	2			2	Min. C
67	MKU6209	Indonesian	2			2	Min. C
68	EKO6245	Transmission and Distribution Lab. Work		2		2	
69	EKO6246	Micro Teaching		2	1	3	Min. B
70	EKO6247	Electrical Power Plant	2			2	

No	Code	Courses	Credit				Ket
			T	P	L	J	
71	EKO6248	Electrical Power Plant Lab. Work		2		2	
72	KTF6210	Vocational Guidance	2			2	
73	EKO6255	Flexible Manufacturing System Lab. Work**		2			
76	EKO6252	Industrial Automation System Design Lab Work**		2		2	
77	EKO6253	Pneumatics Lab Work**		2			
Total Credits 6th Semester			13	12	1	22	
7th Semester							
78	MKU6313	Student's Community Service			3	3	Min C
79	PPL6301	Educational Internship			3	3	
Total Credits 7th Semester			0	0	6	6	
8th Semester							
80	MKP6602	Undergraduate Thesis Writing			6	6	
Total Credits 8th Semester			0	0	6	6	
Total Credits			87	57	17	147	

Information:

** Choose one of the elective courses

G. COMPETENCY MATRIX OF CURRICULUM

Every result of the lecture is expected to achieve certain learning outcomes, therefore lectures are developed to achieve this specific learning outcome. The contribution of each lecture to the expected learning outcomes is presented in the table below. The relevance of lectures to learning outcomes is coded in three levels, namely '1' for low support, '2' for support, and '3' for high support. As can be seen in the table, most courses facilitate several learning outcomes with different weights.

Code	Courses	Learning outcome									Total credit
		1	2	3	4	5	6	7	8	9	
1st Semester											
MKU6301	Islamic Studies	3	2								3
MKU6302	Catholic Studies	3	2								
MKU6303	Christian Studies	3	2								
MKU6304	Buddhism Studies	3	2								
MKU6305	Hinduism Studies	3	2								
MKU6306	Confucianism Studies	3	2								
MDK6201	Science of Education	2	3						1	2	
KTF6205	Mathematics	1	1		3	2	1			2	
KTF6206	Physics	1	1		3	2	1			2	
EKO6201	Fundamentals of Electrical	1	1		3	2	1			2	
EKO6202	Electronics	1	1		3	2	1			2	
EKO6303	Digital Engineering Laboratory Work	1	1		2	3	1			3	
EKO6204	Computer Programming Laboratory Work	1	1		2	3	1			2	
EKO6205	Engineering Drawing Laboratory Work	1	1		2	3	1			2	
EKO6206	Mechanical Technology Laboratory Work	1	1		2	3	1			2	
MKU6211	English	1	1	1					2	3	2
Total Credits 1st Semester											24

Code	Courses	Learning outcome									Total credit
		1	2	3	4	5	6	7	8	9	
2nd Semester											
MKU6208	Pancasila	2	3								2
MDK6203	Education Management	1	1			1	3	2			3
EKO6307	Mathematics Engineering	1	1		3	2	1				3
EKO6308	Electrical Circuit	1	1		3	2	1				3
EKO6209	Electronics Practices	1	1	1	2	3					2
EKO6210	Basic Electrical Practices	1	1	1	2	3					2
EKO6211	Control System	1	1		3	2	1				2
EKO6212	Computer Network	1	1		3	2		1			2
EKO6213	Microprocessor System	1	1		3	2	1				2
EKO6314	Electrical Machine	1	1		3	2	1				3
Total Credits 2nd Semester											24
3rd Semester											
MKU6207	Civic Education	2	3	1							2
MDK6202	Educational Psychology	1	3				2				2
EKO6215	Control Systems Laboratory Work	1	1		2	3	1				2
EKO6216	Microprocessor Systems Laboratory Work	1	1		2	3	1				2
EKO6217	Electrical Circuit Laboratory Work	1	1		2	3	1				2
EKO6218	Electric Machinery Laboratory Work	1	1		2	3	1				2
EKO6219	Power Electronics	1	1		3	2	1				2
EKO6220	Commercial Electricity Installation	1	1		3	2	1				2
EKO6221	Commercial Electricity Installation Lab. Work	1	1		2	3	1				2
KTF6207	Commercial Electricity Installation Lab. Work	1	1		3	2	1				2
MDK6204	Educational Socio-anthropology	2	3					1			2
Total Credits 3rd Semester											22
4th Semester											
Power Engineering											
KTF6208	Technology and Vocational Education	1	1			1	2	3			2
EKO6222	Power Electronics Laboratory Work	1	1		2	3	1				2

Code	Courses	Learning outcome									Total credit
		1	2	3	4	5	6	7	8	9	
EKO6223	Electricity Installation Design**	1	1		3	2	1				2
EKO6224	Electricity Installation Design Laboratory Work**	1	1		2	3	1				2
MKU6210	Statistics	1	1			1		2	3		2
EKO6225	Electrical Power Protection	1	1		2	3	1				2
EKO6327	Programmable Logic Controller Lab. Work	1	1		2	3	1				3
EKO6228	Industrial Electricity Installation	1	1		3	2	1				2
EKO6229	Industrial Electricity Installation Lab. Work	1	1		2	3	1				2
EKO6230	Industrial Management	1	1	3		2	1				2
EKO6231	Electrical Power System Analysis**	1	1		3	2	1				2
MDK6205	Counselling Guidance**	1	1	3			2				2
Total Credits 4th Semester											23
Industrial Automation											
KTF6208	Technology and Vocational Education	1	1			1	3	2			2
EKO6222	Power Electronics Laboratory Work	1	1		2	3	1				2
EKO6233	Robotics**	1	1		3	2	1				2
EKO6234	Industrial Automation Engineering Work**	1	1		2	3	1				2
EKO6225	Electrical Power Protection	1	1		3	2	1				2
MKU6210	Statistics	1	1			1		2	3		2
EKO6327	Programmable Logic Controller Lab. Work	1	1		2	3	1				3
EKO6228	Industrial Electricity Installation	1	1		3	2	1				2
EKO6229	Industrial Electricity Installation Lab. Work	1	1		2	3	1				2
EKO6230	Industrial Management	1	1	3		2	1				2
EKO6235	Intelligent Control systems**	1	1		3	2	1				2
MDK6205	Counselling Guidance**	1	1	3			2				2
Total Credits 4th Semester											23

Code	Courses	Learning outcome									Total credit
		1	2	3	4	5	6	7	8	9	
5th Semester											
Power Engineering											
KTF6203	Instructional Media	1	1				3	2		1	2
KTF6201	Curriculum & Instructional of Vocational	1	1				1	2		3	2
EKO6226	Electrical Power Protection Lab. Work	1	1		2	3	1				2
KTF6202	vocational Instructional Strategic	1	1				1	2		3	2
KTF6204	Vocational Learning Assessment	1	1				3	2		1	2
KTF6309	Industrial Internship	1	1	3	1				2		3
EKO6336	Education Multimedia Design Lab. Work	1	1					1	2	3	3
EKO6237	Transmission and Distribution	1	1		3	2	1				2
EKO6238	Electrical Maintenance and Services Lab. Work	1	1		2	3	1				2
EKO6239	Energy Management	1	1		2	3	1				2
EKO6240	Electrical power System Simulation Lab. Work**	1	1		2	3	1				2
EKO6241	Laboratory Management**	1	1			1	2	3			2
EKO6254	Professional Ethics**	1	2	3		1					2
Total Credits 5th Semester											22
Industrial Automation											
KTF6203	Instructional Media	1	1				3	2		1	2
KTF6201	Curriculum & Instructional of Vocational	1	1				1	2		3	2
EKO6226	Electrical Power Protection Lab. Work	1	1		2	3	1				2
KTF6202	Vocational Instructional Strategic	1	1				1	2		3	2
KTF6204	Vocational Learning Assessment	1	1				3	2		1	2
KTF6309	Industrial Internship	1	1	3	1				2		3
EKO6336	Education Multimedia Design Lab. Work	1	1					1	2	3	3
EKO6237	Transmission and Distribution	1	1		3	2	1				2

Code	Courses	Learning outcome									Total credit
		1	2	3	4	5	6	7	8	9	
EKO6238	Electrical Maintenance and Services Lab. Work	1	1		2	3	1				2
EKO6242	Interfacing Laboratory Work**	1	1		2	3	1				2
EKO6243	Sensor and Transducer Lab. Work**	1	1		2	3	1				2
EKO6244	Digital Control**	1	1		3	2	1				2
EKO6254	Professional Ethics**	1	2	3		1					2
Total Credits 5th Semester											22
6th Semester											
Power Engineering											
MKU6214	Sociocultural Education	2	3	1							2
MKP6301	Education Research Method	1	1				1	2	3		3
MKU6212	Entrepreneurship	2	3	1							2
MKU6209	Indonesian Language	1	1	2				3			2
EKO6245	Transmission and Distribution Lab. Work	1	1		2	3	1				2
EKO6246	Micro Teaching	1	1				2	3	1		3
EKO6247	Electrical Power Plant	1	1		3	2	1				
EKO6248	Electrical Power Plant Lab. Work	1	1		2	3	1				2
KTF6210	Vocational Guidance	1	1			1	2	3			2
EKO6255	Flexible Manufacturing System Lab. Work**	1	1		2	3	1				2
EKO6250	Refrigerant and Air Conditioning Lab Work**	1	1		2	3	1				2
EKO6251	Electrical Power System Operation**	1	1		3	2	1				2
Total Credits 6th Semester											20
Industrial Automation											
MKU6214	Sociocultural Education	2	3	1							2
MKP6301	Education Research Method	1	1				1	2	3		3
MKU6212	Entrepreneurship	2	3	1							2
MKU6209	Indonesian	1	1	2				3			2
EKO6245	Transmission and Distribution Lab. Work	1	1		2	3	1				2
EKO6246	Micro Teaching	1	1				2	3	1		3
EKO6247	Electrical Power Plant	1	1		3	2	1				2


Code	Courses	Learning outcome									Total credit
		1	2	3	4	5	6	7	8	9	
EKO6248	Electrical Power Plant Lab. Work	1	1		2	3	1				2
KTF6210	Vocational Guidance	1	1			1	2	3			2
EKO6255	Flexible Manufacturing System Lab. Work**	1	1		2	3	1				2
EKO6252	Industrial Automation System Design Lab Work**	1	1		2	3	1				2
EKO6253	Pneumatics Lab Work**	1	1		2	3	1				2
Total Credits 6th Semester											22
7th Semester											
MKU6313	Student's Community Service	1	2	3							3
PPL6301	Educational Internship	1	1				2	3		1	3
Total Credits 7th Semester											6
8th Semester											
MKP6602	Undergraduate Thesis Writing	1	1			1			3	2	6
Total Credits 8th Semester											6
Total Credits											147

Table Remarks:

Choose one of the courses =*

Choose one of the elective courses =**

University / General Courses 

Faculty Courses 

Study Program Courses 

Note on Learning Outcome Columns: 3 = highly supportive; 2 = supportive;
1 = low supportive

H. COURSES DESCRIPTIONS

No	1.a
Courses	Islamic Studies*
Code / Credits	MKU6301 / 3
Description	
<p>Islamic Education Courses are required to pass for every Muslim student in all study programs, weighing 3 SKS. This course is designed with the intention to strengthen faith and piety in Allah SWT, and broaden the outlook on religious life, so as to form students who are virtuous, think philosophically, be rational and dynamic and have a broad view, by paying attention to demands to respect intra within one people, and in the relationship between religious harmony. Lecture activities are carried out using lecture, dialogue, and paper presentation models. Evaluation is done through written notes, assignments, and reports, and presentations.</p>	

No	1.b
Courses	Catholic Studies *
Code / Credits	MKU6302 / 3
Description	
<p>Catholic Religious Education courses are mandatory for graduating for all Catholic students in all study programs, weighing 3 SKS. This course is designed with the intention to strengthen faith and piety to God Almighty, as well as broaden the outlook on religious life, so that students are formed of virtuous character, philosophical thinking, being rational and dynamic and broad-minded, by paying attention to the demands to respect intra within one people , and in the relationship between religious harmony. Lecture activities are carried out using lecture, dialogue, and paper presentation models. Evaluation is done through written notes, assignments, and reports, and presentations.</p>	

No	1.c
Courses	Christian Studies*
Code / Credits	MKU6303 / 3
Description	
<p>The course of Christian Religious Education is mandatory for graduating for every Christian student in all study programs, weighing 3 SKS. This course is designed with the intention to strengthen faith and piety to God Almighty, as well as broaden the outlook on religious life, so that students are formed of virtuous character, philosophical thinking, being rational and dynamic and broad-minded, by paying attention to the demands to respect intra within one people, and in the relationship between religious harmony. Lecture activities are carried out using lecture, dialogue, and paper presentation models.</p>	

No	1.d
Courses	Buddhism Studies*
Code / Credits	MKU6305 / 3
Description	
<p>Buddhist Religious Education courses are required to pass for all students who are Buddhist in all study programs, weighing 3 SKS. This course is designed with the intention to strengthen faith and piety in God Almighty, as well as broaden the outlook on religious life, so that students form virtuous characters, think philosophically, be rational and dynamic and have a broad view, by paying attention to the demands to respect intra in one community, and in inter-religious harmony relations. Lecture activities are carried out using lecture, log-in, and paper presentation models. Evaluation is done through written notes, assignments, and reports, and presentations.</p>	

No	1.e
Courses	Hinduism Studies*
Code / Credits	MKU6304 / 3
Description	
<p>Religion as understood by most Hindus is not a theory to be memorized, neither is dogma nor words that are empty of meaning. Religion is a demand that contains a set of values that if practiced will be very useful for himself and for others. Hindu Religious Education courses are mandatory for graduating every Hindu student in all study programs, weighing 3 SKS. This course is designed with the intention to strengthen faith and piety in God Almighty, as well as broaden the outlook on religious life, so that students form virtuous characters, think philosophically, be rational and dynamic and have a broad view, by paying attention to the demands to respect intra in one community, and in inter-religious harmony relations. Lecture activities are carried out using lecture, log-in, and paper presentation models. Evaluation is done through written, assignments, and reports, and presentations.</p> <p>This subject contains the following subjects: (1) Getting to know religion; (2) Sradda; (3) Marga goes to God; (4) Ethics; (5) Life necessities of Hin-du people; (6) Family life; (7) Science and religion; (8) Yajna: symbolic communication; (9) Cooperation between religions; (10) Service as worship.</p>	

No	1.f
Courses	Confucianism Studies*
Code / Credits	MKU6306 / 3
Description	
<p>In this course, Confucianism is a belief as well as obedience in living life, in which the more visible aspect of the teachings developed in Confucianism is a social aspect whose purpose is to uphold moral and social values for human life.</p>	

No	2
Courses	Science of Education
Code / Credits	MDK6201 / 2
Description	
<p>This course discusses the basic principles of education and the basic concepts of education and its application in educational praxis which includes: the phenomenon of education, the historical perspective of education, the nature of education and education, education as a system, and issues (issues of education in contexts) educational renewal (innovation).</p>	

No	3
Courses	Mathematics
Code / Credits	KTF6205 / 2
Description	
<p>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.</p>	

No	4
Courses	Physics
Code / Credits	KTF6206 / 2
Description	
<p>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.</p>	

No	5
Courses	Fundamentals of Electrical
Code / Credits	EKO6201 / 2
Description	
<p>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 one-phase sources, selecting a measuring instrument and analyzing the results of measuring electric quantities . 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.</p>	

No	6
Courses	Electronics
Code / Credits	EKO6202 / 2
Description	
<p>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.</p>	

No	7
Courses	Digital Engineering Laboratory Work
Code / Credits	EKO6303 / 3
Description	
<p>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.</p>	

No	8
Courses	Computer Programming Laboratory Work
Code / Credits	EKO6204 / 2
Description	
<p>This course will study, understand, 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 algorithms, the basics of programming, being able to use C ++ in solving problems, and making projects based on C ++ programming. Lectures are conducted using a student center approach. Learning strategies include the delivery of theory (lectures), practice, completion of assignments, and presentations. The evaluation system uses assignments and tests.</p>	

No	9
Courses	Engineering Drawing Laboratory Work
Code / Credits	EKO6205 / 2
Description	
<p>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 components, theoretical learning tools, devices practical learning, 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.</p>	

No	10
Courses	Mechanical Technology Laboratory Work
Code / Credits	EKO6206 / 2
Description	
<p>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.</p>	

No	11
Courses	English
Code / Credits	MKU6211 / 2
Description	
<p>English courses include material to activate students' Listening, Reading, Speaking, Writing and Grammar abilities in using English especially in the fields of electrical engineering and education.</p>	

No	12
Courses	Pancasila
Code / Credits	MKU6208 / 2
Description	
<p>This lecture discusses the foundations and objectives of Pancasila Education, Pancasila in the context of the history of the struggle of the Indonesian nation, Pancasila as a philosophical system, Pancasila as a political ethics and national ideology, Pancasila in the context of R.I and Pancasila as a paradigm of life in society, nation and state.</p>	

No	13
Courses	Education Management
Code / Credits	MDK6203 / 2
Description	
<p>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.</p> <p>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.</p>	

No	14
Courses	Mathematics Engineering
Code / Credits	EKO6307 / 3
Description	
<p>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 certain form of certainty. The reasoning materials in this engineering mathematics course are: differential and integral for functions with two (2) free or more changes, vector analysis, ordinary differential equations and linear differential equations, as well as 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.</p>	

No	15
Courses	Electrical Circuit
Code / Credits	EKO6308 / 3
Description	
<p>Electrical Circuits 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.</p>	

No	16
Courses	Electronics Practices
Code / Credits	EKO6209 / 2
Description	
<p>Lectures in Electronic Practice is to prove the count of the electronic theory that has been obtained in the Electronics course. Lectures train the skills to assemble electronic components and measure electrical quantities such as voltage, current, and frequency. Students are able to calculate the value of voltage reinforcement. The implementation of this course is individual, meaning that each student receives a practicum module, a measuring instrument for voltage, current, and oscilloscope as well as a sine wave signal generator. 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 an amplifier, an operating amplifier as a reversing and non-reversing amplifier, and an operating amplifier as a wave generator.</p>	

No	17
Courses	Basic Electrical Practices
Code / Credits	EKO6210 / 2
Description	
<p>The Basic Electric Practice course will develop student competencies regarding basic electricity concepts and laws, electrical circuit elements, methods and theorems of unidirectional source circuit analysis, phasor concepts and their application in a series of alternating one-phase sources, choosing 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.</p>	

No	18
Courses	Control System
Code / Credits	EKO6211 / 2
Description	
<p>Full System Basic Course Material discusses the understanding of control systems, process dynamics and modeling, sequential control, control with a good feedback technique, mathematical modeling of physical systems with a block diagram approach with its Laplace transform and signal flow graph, order system response analysis 1,2 and high; system stability settings, application examples and basic control actions (on / off, P, PI, PD, PID). As well as an introduction to using MATLAB as a response analysis tool, system stability and controller design.</p>	

No	19
Courses	Computer Network
Code / Credits	EKO6212 / 2
Description	
<p>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.</p>	

No	20
Courses	Microprocessor System
Code / Credits	EKO6213 / 2
Description	
<p>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 the electrical engineering system.</p>	

No	21
Courses	Electrical Machine
Code / Credits	EKO6314 / 3
Description	
<p>This course provides experience about attitudes related to devotion to God, the practice of values, norms, and academic ethics, and can carry out work in accordance with the professional field of expertise both individually and in teams. In addition, this course also provides knowledge 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.</p>	

No	22
Courses	Civic Education
Code / Credits	MKU6207 / 2
Description	
<p>Citizenship Education as a group Institutional courses function as student orientation in strengthening national insight and enthusiasm, love for the country, democracy, legal awareness, respect for diversity and participation in building a nation based on Pancasila. In accordance with its function, Citizenship Education organizes national, democratic, legal, multicultural and citizenship education for students to support the realization of citizens who are aware of their rights and obligations, as well as intelligent, skilled and characterized so that they can be relied on to build the nation.</p>	

No	23
Courses	Educational Psychology
Code / Credits	MDK6202 / 2
Description	
<p>Educational Psychology Lectures will develop contextual thinking (according to the characteristics of the study program) and develop elements of instructional 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 methods. The final task of this lecture individually is to make a book about self-success design. Competency-based assessment involves active participation, and communication of interactions between individuals and groups.</p>	

No	24
Courses	Control Systems Laboratory Work
Code / Credits	EKO6215 / 2
Description	
<p>Control System Practice is a practical course that aims to have students competing in explaining and assembling several types of control systems, including a simple open loop control system and closed loop control system for controlling motor speed and position (servomechanism). Students are expected to be able to explain the response of first and second order systems, both transient responses and steady state conditions of the system. Furthermore, students are expected to be able to assemble the PID control system and be able to explain the characteristics of each parameter P (Proportional), I (Integral), and D (Derivative).</p>	

No	25
Courses	Microprocessor Systems Laboratory Work
Code / Credits	EKO6216 / 2
Description	
<p>This course discusses the introduction of microprocessors or microcomputers, Zilog-80 microprocessors, MPF-1 Microcontroller programming, various addressing modes, Arithmetic and logic operations, jump and loop operations, 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 and microcontroller applications in electrical engineering systems.</p>	

No	26
Courses	Electrical Circuit Laboratory Work
Code / Credits	EKO6217 / 2
Description	
<p>Electrical Circuit Practice Classes develop intact competencies (affective, knowledge, and more on practical skills) related to the introduction of electrical materials and tools, RLC electrical loads, the introduction and use of various electrical and DC measurement devices, various types of DC electrical circuits and AC, series, parallel and mixed circuits, charging and discharging inductors and capacitors, the effect of frequency on series and parallel RLC loads, resonance, star and triangle connections, phase sequence tests, balanced and unbalanced 3-phase load power measurements, and power quality . Lectures carried out by demonstration, observation, practice, both individuals and groups. Competency-based assessment uses authentic assessments which include: attendance, attitude (piety, participation, tidiness, cooperation, and work safety), knowledge and skills that are reflected in (group practice assignments, individual practice reports, and competency tests (practice) individually).</p>	

No	27
Courses	Electric Machinery Laboratory Work
Code / Credits	EKO6218 / 2
Description	
<p>The study materials discussed in this course include experiments on: direct current generator, direct current motor, 1 phase transformer, 3 phase transformer, non-synchronous alternating current motor, alternating current generator (alternator), and synchronous motor . The study of each material's experiments include: arranging a series of experiments, operating the experiment, measuring the parameters of the experiment, performing trouble shooting, analyzing the characteristics, calculating the efficiency and other quantities of each of the study materials.</p>	

No	28
Courses	Power Electronics
Code / Credits	EKO6219 / 2
Description	
<p>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 electronic 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.</p>	

No	29
Courses	Commercial Electricity Installation
Code / Credits	EKO6220 / 2
Description	
<p>The lecture will develop contextual thinking about the scope of commercial electricity installations. The scope of material in this course covers commercial electrical installation materials and equipment, protection systems, applicable installation requirements, wiring diagrams and single lines, lighting and power installations, determining delivery and calculation of load capacities, feeders and panels, grounding systems and lightning rods in Indonesia and the implementation of test commissioning. Lectures are carried out with various approaches that are appropriate to the context of the material and the potential of students, including: contextual, project base learning, and problem base learning that lead to student center learning. Continuous assessment is carried out on a competency basis and harmonized with lecture activities.</p>	

No	30
Courses	Commercial Electricity Installation Lab. Work
Code / Credits	EKO6221 / 2
Description	
<p>This course practices electrical installations in commercial buildings. The scope of material in this course covers the use of measuring devices in commercial installations, lighting installations in commercial buildings, 1 phase and 3 phase electric motor control techniques, cable connections, single switch installations, exchange switches and serial switches to serve the load of lighting lamps equipped with safety, power installation, protection in commercial buildings, installation of protective equipment (MCB, ELCB, NFB, ACB, fuse) and automatic control using light sensors in commercial buildings.</p>	

No	31
Courses	Occupational Health and Safety
Code / Credits	KTF6207 / 2
Description	
<p>This course discusses OHS Management based on available theories, analyzes the risk of workplace accidents with existing methods, to further produce materials for analyzing examples of work accidents in the electric and heavy equipment fields to achieve safe workplace conditions. .</p>	

No	32
Courses	Educational Socio-anthropology
Code / Credits	MDK6204 / 2
Description	
<p>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 Indonesia (anthropos) in realizing Indonesia's current and future national education goals.</p>	

No	33
Courses	Technology and Vocational Education
Code / Credits	KTF6208 / 2
Description	
<p>This course provides students with insight, knowledge, and learning experiences about the nature of technology and vocational / vocational education (PV) which includes: PV foundation, PV development, (3) the role of PV in the development of HR and skilled personnel, PV implementation models, policies in PV, and contemporary PV issues. Lectures are carried out using the student center learning approach in the form of lectures and class and group discussions by assigning critical observations and analysis to the practices of implementing vocational education in Indonesia. Assessment is done by involving active participation in lectures, quizzes, midterm insertions exams, and final semester exams.</p>	

No	34
Courses	Power Electronics Laboratory Work
Code / Credits	EKO6222 / 2
Description	
<p>This course is a practical course on the conversion of energy-based energy electronics for the purpose of controlling large power electric equipment. Practice material includes the introduction of power electronics practice units, power electronics components, AC / DC, DC / DC conversion circuits, AC / AC, DC / AC and drive circuits and their applications. Lectures are carried out using the student center learning approach with project-based learning strategies. Competency-based assessment involves active participation in practicum, preparation, data collection, reporting of practicum results, and individual examinations.</p>	

No	35
Courses	Electricity Installation Design **
Code / Credits	EKO6223 / 2
Description	
<p>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.</p>	

No	36
Courses	Electricity Installation Design Laboratory Work **
Code / Credits	EKO6224 / 2
Description	
<p>This course discusses basic planning, system planning & electrical installation of lighting, power, electrical panels, lightning rods, air conditioning / air conditioning, telecommunications, sound & MATV, CCTV & building security alarms, fire alarms, technical requirements, technical analysis , job analysis, cost analysis and budget plans, inspections and tests.</p>	

No	37
Courses	Statistics
Code / Credits	MKU6210 / 2
Description	
<p>This subject discusses the role of statistics in the field of research, descriptive statistics: frequency distribution, steam distribution, inferential statistics: probability discrete change theory, binomial distribution, normal continuous variable distribution, chi-square, student-t and Fisher; characteristics of the sampling distribution, hypothesis testing: two groups difference test with t-opportunity distribution, tests differing more than two groups with variance analysis with assumptions and further tests; correlation and regression analysis, and the use of some nonparametric statistics.</p>	

No	38
Courses	Electrical Power Protection
Code / Credits	EKO6225 / 2
Description	
<p>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 types of interference, protection devices, configuration & work systems; Distribution Network Protection, covering types of interference, protection devices, configuration & work systems; Motor protection, including type of interference, protection devices, configuration & work system. Lectures are carried out with various approaches that are appropriate 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.</p>	

No	39
Courses	<i>Programmable Logic Controller</i>
Code / Credits	EKO6227 / 2
Description	
This course discusses the introduction of PLC starting from understanding terms, configuration, PLC system block diagram, PLC basic programming, PLC application programming.	

No	40
Courses	Industrial Electricity Installation
Code / Credits	EKO6228 / 2
Description	
The lecture will develop contextual thinking about the scope of commercial electricity installations. The scope of material in this course covers commercial electrical installation materials and equipment, protection systems, applicable installation requirements, wiring diagrams and single lines, lighting and power installations, determining delivery and calculation of load capacities, feeders and panels, grounding systems and lightning rods in Indonesia and the implementation of test commissioning. Lectures are carried out with various approaches that are appropriate to the context of the material and the potential of students, including: contextual, project base learning, and problem base learning that lead to student center learning. Continuous assessment is carried out on a competency basis and harmonized with lecture activities.	

No	41
Courses	Industrial Electricity Installation Lab. Work
Code / Credits	EKO6229 / 2
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 with manual and automatic settings, automatic main failure as backup of the main network (PLN) when automatic and relay based shutdown, 20 kv medium voltage protection system and industrial installation based on programmable logic control (PLC).	

No	42
Courses	Industrial Management
Code / Credits	EKO6230 / 2
Description Industrial Management is a subject supporting the competency 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 are able to 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.	

No	43
Courses	Electrical Power System Analysis **
Code / Credits	EKO6231 / 2
Description	
<p>Electric Power System Analysis (STL) is a theoretical course given to students to equip capabilities in the field of electric power systems and analysis to obtain a stable and optimal system. The material covered includes the basic concepts of STL, STL components, STL modeling with a single line diagram (SLD), interference with STL, type of disturbance in STL, analysis of short circuit faults, analysis of sudden causes of STL, studies of electrical load flow , power system stability and STL optimization. Lectures are carried out using the student center learning approach through lecture lectures in class combined with group discussions and case studies. Competency-based assessment involves active participation, and communication of interactions between individuals and groups.</p>	

No	44
Courses	Counselling Guidance**
Code / Credits	MDK6205 / 2
Description	
<p>This course discusses the concept of vocational counseling guidance covering principles, principles, and career guidance functions. The material includes career guidance approaches, career guidance foundation, career building strategies and techniques, job information resources, job selection and career development, counseling techniques, work placements, organization-administration-evaluation of vocational guidance, job application administration, and career development for participants with disabilities special.</p>	

No	45
Courses	Robotics**
Code / Credits	EKO6233 / 2
Description	
<p>Robotics Lecture Material discusses the understanding of robots, application of robot systems, sensors and transducers, robot motor actuators, robot controllers, robot navigation programming, robot system assembly, examples of wheeled or legoid / humanoid robot systems. Robot programming based on various platforms such as Arduino based, NXT brick LEGO and RoboPlus from Robotis is also part of the introductory material for the final project in the form of a prototype robot.</p>	

No	46
Courses	Industrial Automation Engineering Work **
Code / Credits	EKO6234 / 2
Description	
<p>This course practices the development of PLCs for industrial applications. The material covers PLC control for the production, distribution and selection process.</p>	

No	47
Courses	Intelligent Control systems**
Code / Credits	EKO6235 / 2
Description	
<p>Intelligent Control System lectures to develop student competencies 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 emphasizing the principles of improving the performance of intelligent control systems based on fuzzy logic (LF), artificial neural networks (ANN) and genetic algorithms (AG), both software and hardware-software. Lectures are carried out using the student centered learning (SCL) approach, with problem based and project based learning models. Competency-based assessment involves active participation, individual and group assignments, midterms and final semester exams.</p>	

No	48
Courses	Instructional Media
Code / Credits	KTF6203 / 2
Description	
<p>This course discusses the development of contextual thinking (according to the characteristics of the study program) and elements of learning media. The main studies include: the concept of perception, learning communication, information technology, the functions and benefits of learning media, as well as the taxonomy of conventional learning media, development models, instructional designs. 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 with the approach of student center learning and independent media production. Competency-based assessment and performance involving active participation and communication.</p>	

No	49
Courses	Curriculum & Instructional of Vocational
Code / Credits	KTF6201 / 2
Description	
<p>This course equips students with the ability to comprehensively comprehend the concepts of curriculum planning, implementation, and evaluation and be 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; curriculum development principles; curriculum development model and organization; vocational learning approaches, strategies and models. Lectures are conducted either with lectures, class discussions or groups that are equipped with the assignment of observations and critical analysis of the practices of vocational education curriculum development.</p>	

No	50
Courses	Electrical Power Protection Lab. Work
Code / Credits	EKO6226 / 2
Description	
<p>Electric Power Protection Practice Lectures will develop student competencies regarding the operation and setting of 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 various approaches that are appropriate to the context of the material and the potential of students, including: contextual, project base learning, and problem base learning that lead to student center learning. Continuous assessment is carried out on a competency basis and harmonized with lecture activities.</p>	

No	51
Courses	Vocational Instructional Strategic
Code / Credits	KTF6202 / 2
Description	
<p>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 components, theoretical learning tools, devices practical learning, 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.</p>	

No	52
Courses	Vocational Learning Assessment
Code / Credits	KTF6204 / 2
Description	
<p>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.</p>	

No	53
Courses	Industrial Internship
Code / Credits	KTF6309 / 3
Description	
<p>This course is a work practice in industry for 2 months to find, formulate, and find solutions to problems in the world of work (industry) and prepare reports to be presented.</p>	

No	54
Courses	Education Multimedia Design Work
Code / Credits	EKO6336 / 3
Description	
<p>This subject is a compulsory subject which is a continuation and / or development of the Media Education (Theory) course. As a practical course (2 credits), in principle this course discusses the basic concepts and implementation of the stages of multimedia-based learning design (Multimedia-based Instructional Design) with the approach of Analysis, Design, Development, Implementation and Evaluation. Stages of analysis emphasize the need assessment and front-end analysis activities in the scope of learning in a classroom. Followed by the design of instructional media, then the development and implementation stages and ending with testing the learning media. Introducing the latest learning multimedia such as Augmented Reality and virtual reality.</p>	

No	55
Courses	Transmission and Distribution
Code / Credits	EKO6237 / 2
Description	
<p>This course deals with the analysis of operations in the Electric Power Transmission and Distribution System which includes: Model single line diagrams and impedance diagrams on the Electric Power System, Parameters of Electric Power Transmission Lines, Current and Voltage Relations on Electric Power Transmission Lines, Air Line Transmission Construction Analysis High Voltage, Characteristics and design of Electric Power Distribution Channels, Characteristics of air ducts and underground cables on Electric Power Distribution Channels, Characteristics of electric loads, Application of electric power distribution transformers, Voltage drop and power loss calculations, Application of capacitors on Electric Power Distribution Channels.</p>	

No	56
Courses	Electrical Maintenance and Services Lab. Work
Code / Credits	EKO6238 / 2
Description	
<p>This course discusses the management of maintenance and repair of electrical systems ranging from existing components in the generating sub-system to the utilization sub-system. The scope of this course material includes: examinations and tests on power plants, checks and tests on power transformers, checks and tests on lighting installations, checks and tests on power installations, checks and tests on lightning distribution systems, rewinding 1 phase electric motors, rewinding 3 phase electric motors, and preparing reports and recommendations on the results of inspection and testing activities.</p>	

No	57
Courses	Energy Management**
Code / Credits	EKO6239 / 2
Description	
<p>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.</p>	

No	58
Courses	Electrical Power System Simulation Work**
Code / Credits	EKO6240 / 2
Description	
<p>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 studies, harmonic studies.</p>	

No	59
Courses	Laboratory Management**
Code / Credits	EKO6241 / 2
Description	
<p>Electric Power System Analysis 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 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.</p>	

No	60
Courses	Professional Ethics**
Code / Credits	EKO6254 / 2
Description	
<p>This course provides knowledge about ethics, ethical awareness and ethical behavior in carrying out the vocational teacher profession in the electrical engineering field. This knowledge covers various spectrums of thought in ethics, description of ethics and the teaching profession, ethical issues in the profession, and their implementation and development in the practice of the technical vocational teacher profession.</p>	

No	61
Courses	Interfacing Laboratory Work**
Code / Credits	EKO6242 / 2
Description	
<p>Interface Engineering Practice is a practical course that aims for students who take this course to have competence in implementing commonly used interface protocols, 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.</p>	

No	62
Courses	Sensor and Transducer Lab. Work**
Code / Credits	EKO6243 / 2
Description	
<p>This Sensor and Transducer Practice Lecture discusses the introduction and application of sensors in the fields of electro, machinery, and mechatronics. This course studies various sensors, such as light, sound, fire, gas, humidity, magnetism, distance, and solar sensors. This course also learns how to apply and use it in a series. Lectures are carried out using the student center learning approach. Assessment uses assessment of attitude, performance and performance. This course is a concentration course for the concentration of industrial automation.</p>	

No	63
Courses	Digital Control**
Code / Credits	EKO6244 / 2
Description	
<p>This course covers general configuration of digital control systems, other terms, brief history of digital control system development, hardware configuration, various digital controllers, analog / digital conversion, snapshots, continuous and discrete time signals, retention order-zero (ZOH), Transformational Z principles, Ratio-based modeling, digital PID controllers, space-state modeling, signal flow charts, state equation solutions, stability analysis, digital filters.</p>	

No	64
Courses	Sociocultural Education
Code / Credits	MKU6214 / 2
Description	
<p>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 strengthen 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.</p>	

No	65
Courses	Education Research Method
Code / Credits	MKP6301 / 3
Description	
<p>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.</p>	

No	66
Courses	Entrepreneurship
Code / Credits	MKU6212 / 2
Description	
<p>This course will equip students to be able to build the spirit / soul and character of entrepreneurship, understand the concept of entrepreneurship, and practice entrepreneurial skills / skills. The scope of this course material includes: development of spirit / character and entrepreneurial character, achievement motivation, entrepreneurial nature, business ethics and social responsibility, production management, finance, marketing and human resources, business opportunities, business plans, and entrepreneurial practices / learning projects.</p> <p>The learning strategy uses the student center approach with methods including: lectures, discussions, games, assignments, simulations, and field practice and presentations. Evaluation of evaluation uses the assignment model, presentation and written test.</p>	

No	67
Courses	Indonesian Language
Code / Credits	MKU6209 / 2
Description	
<p>Indonesian language skills are an absolute requirement for Indonesian students to be able to express their thoughts to other parties effectively. The Indonesian language course is expected to make students possess high communication skills in the scientific realm. Based on the mastery of language functions and their variety and barrel, reading spelling skills, sentences, paragraphs, and types of discourse, as well as reproducing texts from various sources, students are expected to be able to write and speak well in Indonesian scientific barrel. Students are expected to understand aspects of scientific papers including definitions and types of scientific papers, and be able to compile scientific papers both popular, semi-formal and formal. Students are able to implement the ethics of authorship and refrain from actions that include plagiarism.</p>	

No	68
Courses	Transmission and Distribution Lab. Work
Code / Credits	EKO6245 / 2
Description	
<p>This course practices the phenomena that occur in the process of transmitting and distributing electric power from generators to users. The scope of this course material includes: load characteristics of R, L and C on DC and AC sources, phase sequence checking, voltage regulation and power flow on a simple transmission line, simulation of voltage drop and phase angle on the transmission line, parameters that affect the flow real and reactive power, the use of transformers to increase power transfer capacity, alternators, synchronous motors, long lines and synchronous capacitors, synchronous motor operations at low loads, and the stability of power system switching.</p>	

No	69
Courses	Micro Teaching
Code / Credits	EKO6246 / 2
Description	
<p>This course provides students with the capability to have pedagogical competencies, professional competencies, personality competencies, and social competencies. These competencies include an understanding of basic teaching skills, preparation of lesson plans, practice of limited basic teaching skills, practice of integrated basic teaching skills, both in learning theory, practice in the laboratory, and in the workshop.</p>	

No	70
Courses	Electrical Power Plant
Code / Credits	EKO6247 / 2
Description	
<p>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, the study also related to the initial drive and electrical equipment in the power plant; 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 interference analysis and generator recovery processes; power change analysis and power plant optimization; and cost analysis and generation management.</p>	

No	71
Courses	Electrical Power Plant Lab. Work
Code / Credits	EKO6248 / 2
Description	
<p>This course studies and practices the working principle of PLTU, PLTA, PLTG and PLTN simulation. Students are taught to learn the characteristics of alternators; paralleling generato; PLTS installation and operation; installation and operation of 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.</p>	

No	72
Courses	Vocational Guidance
Code / Credits	KTF6210 / 2
Description	
<p>In the course, students learn the meaning, function, goals 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 that includes job information, sources of job information, methods for presenting job information, job selection theory and career development, counseling techniques, work placement and follow-up, organization-administration-evaluation of vocational guidance, and techniques for making applications / further study.</p>	

No	73
Courses	Flexible Manufacturing System Lab. Work**
Code / Credits	EKO6255 / 2
Description	
<p>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.</p>	

No	74
Courses	Refrigerant and Air Conditioning Lab Work**
Code / Credits	EKO6250 / 2
Description	
<p>Refrigeration and Air Conditioning Practice Course is a practical course that studies the symbols of refrigeration and ac systems, basic cooling machines, refrigeration systems and ac. Understanding and practice of work systems or operation of refrigeration engines, 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.</p>	

No	75
Courses	Electrical Power System Operation**
Code / Credits	EKO6251 / 2
Description	
<p>This material discusses the generator, transmission, distribution and load. Materials include one-line diagrams, buses for generators, loads and lines, impedance, electric power system models, case studies of power flow and short circuit, system planning under normal and overload conditions, and interference calculations.</p>	

No	76
Courses	Industrial Automation System Design Lab Work**
Code / Credits	EKO6252 / 2
Description	
<p>This course practices the planning and manufacturing of a control / mechatronics system application. The working principle of industrial automation control systems, both conventional, adaptive, and intelligent, planning of industrial automation systems and / or electronic equipment for industrial era 4.0 and its development for various control processes. Hardware and software devices to support the operationalization of design and development automation control systems in various applications in the industry, the development of microcontroller-based automation systems that have at least two input variables and two output variables.</p>	

No	77
Courses	Pneumatics Lab Work**
Code / Credits	EKO6253 / 2
Description	
<p>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.</p>	

No	78
Courses	Student's Community Service
Code / Credits	MKU6313 / 3
Description	
<p>KKN is a field course that develops student soft skills in matters of community life, organizing, dealing with other people / organizations, managing resources, managing differences, building empathy and caring for the community, formulating plans and carrying out activities in groups and independently, to empower community in order to improve the welfare of the community. Empowerment in this case is seen as a process of education, learning, guidance, and assistance to the community to manage their potential, unravel the problems, and find new ideas in order to increase the capacity and capability of the community to improve their welfare.</p>	

No	79
Courses	Educational Internship
Code / Credits	PPL6301 / 3
Description	
<p>This subject is a vehicle for practicing education in schools (SMK). The material covers the teaching and learning process in class and the management of educational activities in schools.</p>	

No	80
Courses	Undergraduate Thesis Writing
Code / Credits	MKP6602 / 6
Description Thesis Final Thesis courses guide students to understand and be able to apply the basic concepts of research. Students are guided to be able to make research proposals by conducting: analysis of problems of a condition (background of the problem), identification of problems, problem boundaries, problem formulation, research objectives. Then proceed with literature review, relevant research studies, create a framework for solving problems, and propose solutions to problems that are temporary (hypotheses) or ask more detailed research questions. After that proceed with the selection of research methods, population and research samples, data collection instruments, and data analysis techniques in accordance with the existing problem formulation. If the research instrument is ready, students can carry out research, analyze data, interpret the results of data analysis, make conclusions, and report research results in the form of a Final Thesis. Final Thesis is arranged according to the correct writing rules and free from plagiarism.	

PART III LEARNING AND ASSESSMENT PROCESS

A. LEARNING PROCESS

Learning is the process of interaction between students with lecturers and with learning resources in a learning environment (Regulation of Ministry of Education and Culture, No. 49 of 2014, article 1 on National Standards for Higher Education). The characteristics of vocational education learning consist of interactive, holistic, integrative, scientific, contextual, effective, collaborative, and student-centered nature.

Vocational education learning can be formed as:

1. Class meeting,
2. Tutorial and feedback, or
3. Laboratory practice, workshop practice, studio practice

Theoretical learning is done in class. The tutorial is carried out systematically and on a scheduled basis. Practical learning is carried out individually or by groups of students in laboratories/workshops, and/or in the field study (industry/company). The process of theoretical learning and practical learning are carried out based on the learning plan called the Syllabus. The syllabus is developed by lecturers independently or groups of expertise. The syllabus contains components:

- a. study program name, name and code of subjects, semester, credits, name of lecturer (individual or team),

- b. learning outcomes of graduates,
- c. the planned competence at each stage of learning to fulfill the learning outcomes of graduates,
- d. study material related to the competence to be achieved,
- e. learning methods,
- f. the period to achieve competence at each stage of learning,
- g. the student learning experience that is manifested in the description of the tasks that must be conducted by students for one semester,
- h. criteria, indicators, and assessment rubric, and
- i. references list used.

The learning process through curricular activities must be carried out systematically and structured through various subjects and a measurable learning load. The learning process through curricular activities must use effective learning methods in accordance with the characteristics of the courses to achieve certain competencies set in the course. Vocational learning methods include group discussions, simulations, case studies, collaborative learning, cooperative learning, project-based learning, problem-based learning, or other learning methods that are relevant and effectively facilitate the fulfillment of learning outcomes. Each course can use one or a combination of several learning methods.

B. ASSESSMENT

Assessment is a process for evaluating learning achievement by using information obtained through measuring the process and

learning outcomes of students in the context of fulfilling graduate learning outcomes. The assessment of the learning process and outcomes of students includes:

1. the assessment rules,
2. assessment techniques and instruments,
3. assessment mechanisms and procedures,
4. the assessment implementation,
5. the assessment report; and
6. graduation judgment.

The principles of assessment include:

- a. Educational principle; is an assessment that motivates students to be able to improve planning and learning methods; and achieving graduate learning outcomes.
- b. Authentic principle; is an assessment that is oriented towards a continuous learning process and learning outcomes that reflect the competence of students in the learning process.
- c. Objective principle; is an assessment that is based on the agreement between lecturer and student and is free from the subjectivity of the evaluator and the evaluated person.
- d. Accountability principle; is an assessment carried out in accordance with procedures and criteria, agreed at the beginning of the lecture, and understood by students.
- e. Transparency principle; is an assessment in which the procedures and results of the assessment are accessible to all stakeholders.

The assessment techniques consist of observation, participation, performance, written tests, oral tests, and questionnaires. Appraisal instruments consist of evaluating processes in the form of rubrics and/or evaluating results in the form of portfolios or design work. The assessment of mastery of knowledge, general skills, and special skills is carried out by selecting one or a combination of sharing techniques and assessment instruments.

The assessment can be carried out by:

1. Lecturer or group of lecturers;
2. Lecturer or group of lecturers by involving technicians/laboratory assistants; and/or
3. Lecturer or group of lecturers by involving relevant stakeholders.



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