



**2015**



# CURRICULUM 2015

**STUDY PROGRAMME**  
MASTER OF ELECTRICAL ENGINEERING EDUCATION

GRADUATE SCHOOL  
UNIVERSITAS NEGERI YOGYAKARTA  
2015

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## INTRODUCTION

The era of industrial revolution 4.0, which coincides with the era of disruption, has a broad impact on economic growth and demands for professional employment qualifications. The development of human resources, which is adaptive to the changes in this era, is needed to meet the job market demands. The Electrical Engineering Education Master's Program, Yogyakarta State University Graduate Program, is developed to meet this challenge.

The Master of Electrical Engineering Education (MEEE) Programme of Universitas Negeri Yogyakarta was officially opened based on the Decree of Minister of Education and Culture of the Republic of Indonesia and the Director General of Higher Education Number 360/E/O/2014 on 27 August 2014 with Accreditation "B". This program is designed with the excellence of producing professional educators in the field of electrical engineering vocational education and training, which are oriented to the demands of new literacy competencies. Its curriculum was developed and oriented to the Indonesian National Qualification Framework; therefore, its graduates will be capable of adapting to job market qualifications.

## VISION

Becoming an excellent, creative, and innovative Master of Electrical Engineering Education (MEEE) Programme at Southeast Asia (Regional) level to produce professional graduates who are devout, independent, and intellectual in vocational education and training by 2025.

## MISSION

- a. Organizing education and teaching that produce educators in vocational education and training, who have academic and professional competences in the field of Electrical Engineering Education;
- b. Carrying out research, study, and development to improve the quality of Electrical Engineering Education in applying vocational education and training;
- c. Mastering theories, application theories, and vocational education and training technology in the field of electrical engineering;
- d. Educating prospective master's students who are able to develop and manage programs and its implementation in vocational education and training at secondary education, higher education, training centers, and non-formal educational institutions;
- e. Building cooperation networks with various relevant agencies in developing and implementing electrical engineering education and training.

## GRADUATE PROFILE

The graduates of the Master of Electrical Engineering Education (MEEE) Programme are expected to be:

1. Educators (teachers or lecturers) in electrical engineering education in formal education, secondary and tertiary education, and vocational education;
2. Educators (instructors) in electrical engineering education and training in non-formal education (education and training centers in government, non-government, and industrial institutions);
3. Researchers in electrical engineering education and training at educational institutions, training institutes, and research institutes;
4. Developers of electrical engineering education and training in formal and non-formal education.

### PROGRAMME OBJECTIVES

1. Possess personal quality and professional ethics based on a scientific approach;
2. Implement approach of Vocational Education problems in electrical engineering based on a scientific study;
3. Develop electrical power or industrial automation knowledge in vocational education;
4. Implement vocational and technical knowledge in electrical engineering in teaching and learning.

### LEARNING OUTCOMES

Each graduate of the Master of Electrical Engineering Education Programme has achieved at least the following learning outcomes:

Programme Learning Outcomes (PLO)	
<b>PLO1</b>	Demonstrate professional ethics based on religious values, patriotism, and academic norms
<b>PLO2</b>	Implement vocational education and engineering based on scientific approach
<b>PLO3</b>	Analyse vocational education and engineering through scientific research
<b>PLO4</b>	Develop vocational education knowledge of electrical engineering in the competency of power or industrial automation based on information technology
<b>PLO5</b>	Develop knowledge of electrical engineering in the competency of power or industrial automation in vocational education based on information technology
<b>PLO6</b>	Publish research of vocational education in electrical engineering through national and international levels
<b>PLO7</b>	Demonstrate critical and creative thinking skills, communication, adaptability, and leadership
<b>PLO8</b>	Implement strategy, model, method, media, learning material, evaluation, and learning assessment in vocational education based on information technology
<b>PLO9</b>	Apply electrical engineering theory in vocational teaching and learning in the competency of power or industrial automation based on information technology

The relevance of programme learning outcomes and sub-programme learning learning outcomes is shown in the following table:

No PLO (Code)	PLO Description	No Sub-PLO	Sub-PLO Description
PLO1	Demonstrate professional ethics based on religious values, patriotism, and academic norms	1.1	Fear God Almighty and be able to show a religious
		1.2	Uphold the value of humanity in carrying out duties based on religion, morals, and ethics
		1.3	Contribute to the improvement of the quality of a community, nation, state and civilization development based on Pancasila
		1.4	Acting as a proud and loving citizen of the country, having nationalism and a sense of responsibility to the country and nation
		1.5	Respecting cultural diversity, views, religion and beliefs, as well as other people's original opinions or findings
		1.6	Cooperate and have social sensitivity and care for the community and the environment
		1.7	Obey the law and discipline in community and state life
		1.8	Internalize academic values, norms, and ethics
		1.9	Demonstrate an attitude of responsibility for vocational education work in the field of electrical engineering independently
		1.10	Internalize the spirit of independence, struggle, and entrepreneurship
		1.11	Master in the concept of academic integrity in general and the concept of plagiarism specifically in terms of the type of plagiarism the consequences of violations and prevention efforts
		1.12	Able to increase the learning capacity independently
		1.13	Able to uphold academic integrity in general and prevent the practice of plagiarism
PLO2	Implement vocational education and engineering based on scientific approach	2.1	Master in the theory and application of scientific philosophy as a basis for the development and innovation of the quality of vocational education in the field of electrical engineering
		2.2	Master in the theory and application of mathematics, logic, and computer programming for the determination and testing of vocational education research data in the field of electrical engineering

No PLO (Code)	PLO Description	No Sub-PLO	Sub-PLO Description
		2.3	Master in the theory and application of vocational education science to improve the quality of civil service governance, leadership, management systems, and quality assurance oriented to standard quality standards in the field of electrical engineering
		2.4	Able to develop logical, critical, systematic, and creative thinking through scientific research, the creation of designs or works of art in the field of science and technology that pay attention to and apply the value of humanities following vocational education in the field of electrical engineering, compile scientific conceptions and study results based on rules, procedures and scientific ethics in the form of a thesis or other equivalent form, and uploaded on the university page, as well as papers that have been published in accredited scientific journals or accepted in international journals
		2.5	Able to make decisions in the context of solving problems in the development of science and technology that pay attention to and apply humanities based on analytical or experimental studies of information and data
PLO3	Analyse vocational education and engineering through scientific research	3.1	Master in the theory and application of various educational research approaches to the selection, application and testing of appropriate research methods in the context of vocational education research problems in the field of electrical engineering
		3.2	Able to develop, design and manage vocational education and learning programs in the field of electrical engineering following national and international quality standards of vocational education
		3.3	Able to design, implement, and recommend based on scientific studies of vocational education problems and electrical engineering expertise to stakeholders
		3.4	Able to carry out academic validation or study according to their area of expertise in solving problems in the relevant society or industry through the development of vocational knowledge and education in the field of electrical engineering

No PLO (Code)	PLO Description	No Sub-PLO	Sub-PLO Description
		3.5	Able to identify scientific fields that are the object of research and position them into a research map developed through an interdisciplinary or multidisciplinary approach
		3.6	Able to document, store, secure, and rediscover research data to ensure validity and prevent plagiarism
PLO4	Develop vocational education knowledge of electrical engineering in the competency of power or industrial automation based on information technology	4.1	Master in the concepts and application of vocational education science for the development, design, and management and innovation of quality learning in the field of electrical engineering
		4.2	Developing, designing, implementing, analyzing, testing, and make decisions through scientific research on vocational education and learning problems in electrical engineering, manifested in the form of scientific research results
PLO5	Develop knowledge of electrical engineering in the competency of power or industrial automation in vocational education based on information technology	5.1	Master in the theory and application of electrical engineering expertise for the development, design, and management and innovation of educational quality to meet the demands of vocational education workforce qualifications in the field of electrical engineering following the current development of technology and labor market demands
		5.2	Able to process big data as material for decision making on educational, learning, research, and technical issues related to electrical engineering expertise
PLO6	Publish research of vocational education in electrical engineering through national and international levels	6.1	Able to arrange ideas, results of thought, and scientific arguments responsibly and based on academic ethics, and communicate them through the media to the academic community and the wider community
		6.2	Able to publish academic work in accredited national scientific journals or reputable international journals
PLO7	Demonstrate critical and creative thinking skills, communication, adaptability, and	7.1	Able to manage, develop and maintain a network of colleagues, colleagues within a wider research institution and community
		7.2	Able to adapt, work together, create, contribute, and innovate in applying science to social life and acting as a global citizen with a global vision

No PLO (Code)	PLO Description	No Sub-PLO	Sub-PLO Description
	leadership	7.3	Able to use at least one international language for oral and written communication
PLO8	Implement strategy, model, method, media, learning material, evaluation, and learning assessment in vocational education based on information technology	8.1	Able to develop, design, and apply vocational education and electrical engineering expertise to innovate instructional material and assessments based on computer and internet technology
		8.2	Able to use information technology in the context of scientific development and implementation in vocational education in the field of electrical engineering
PLO9	Apply electrical engineering theory in vocational teaching and learning in the competency of power or industrial automation based on information technology	9.1	Able to formulate supporting components for the needs of electricity and industrial automation as a consideration in the development, design, and application of instructional programs and instructional media in vocational education
		9.2	Able to manage computer programming as a processing aid and decision making for educational, learning, research, and technical problems related to electrical engineering expertise

## CURRICULUM & COURSE DISTRIBUTION

NO.	CODE	COURSE	SEMESTER AND CREDITS				Number of Credits
			1	2	3	4	
<b>I. BASIC SCIENCE COURSE</b>							
1.	PAS 8201	Philosophy of Science	2				<b>6</b>
2.	PAS 8202	Educational Research Methodology	2				
3.	PAS 8203	Statistics	2				
Number of Credits			<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>II. PROGRAM COURSE</b>							
1.	PTE 8201	Vocational Education and Training Management	2				<b>28</b>
2.	PTE 8202	Curriculum Development of Vocational Education and Training	2				
3.	PTE 8203	Vocational Learning Model		2			
4.	PTE 8204	Vocational Learning Assessment		2			
5.	PTE 8205	Electrical Power System	2				
6.	PTE 8206	Electrical Energy Management		2			
7.	PTE 8207	Electrical Power Automation System			2		
8.	PTE 8208	Electrical Protection System			2		
9.	PTE 8209	Utilization of Electrical Energy			2		
10.	PTE 8110	Thesis Proposal		1			
11.	PTE 8211	Thesis Proposal and Seminar			2		
12.	PTE 8112	Scientific Papers Writing			1		
12.	PTE 8613	Thesis				6	
Number of Credits			<b>6</b>	<b>7</b>	<b>9</b>	<b>6</b>	
<b>III. ELECTIVE COURSE <sup>*)</sup></b>							
1.	PTE 8214	E-Instructional Design		2			<b>6</b>
2.	PTE 8215	Leadership in Vocational and Educational Training		2			
3.	PTE 8216	Professional Development of Vocational Educator		2			
4.	PTE 8217	Vocational Psychology		2			
5.	PTE 8218	Occupational Health and Safety in Electricity		2			
6.	PTE 8219	Management of Electrical Engineering Vocational Laboratory		2			
7.	PTE 8220	Optimal Design of Electric Power			2		
8.	PTE 8221	Electrical Power Computing			2		
9.	PTE 8222	Intelligent Control System			2		
Number of Credits			<b>0</b>	<b>4</b>	<b>2</b>	<b>0</b>	
<b>TOTAL CREDITS TAKEN</b>			<b>12</b>	<b>11</b>	<b>11</b>	<b>6</b>	<b>40</b>

Note : <sup>\*)</sup> Compulsory course (6 credits)

## COURSE DESCRIPTION

No.	Code & Course	Course Description
1.	PAS 8201 Philosophy of Science	This subject discusses the broad outline of philosophy, including epistemology, classical, modern rationalism, classical and modern empiricism, positivism and empirical cycles, Kuhn's notion and paradigm, and phenomenology. In the last weeks, the discussion will be about the dynamics that exist in various philosophy books.
2.	PAS 8202 Educational Research Methodology	This course discusses the development of comprehensive thinking about the concepts of Educational Research Methodology, educational research methods, analysis of literature reviews and research hypothesis, determining population and samples, developing research instruments, data analysis techniques, and applying them in and vocational technology education research; mainly electrical engineering education research. The understanding and actualization of the Educational Research Methodology concept are realized in a research thesis proposal draft for electrical engineering education.
3.	PAS 8203 Statistics	This subject discusses the role of statistics in the field of research, descriptive statistics: frequency distribution, stem-leaf distribution, inferential statistics: discrete change probability theory, binomial distribution, normal continuous variable distribution, chi-square, student-t, and Fisher; characteristics of the sampling distribution, hypothesis testing: two-group difference test with t-probability distribution, difference test of more than two groups with analysis of variance and assumptions and post-hoc test; correlation and regression analysis, and the use of multiple nonparametric statistics. The discussion includes basic concepts, applications, and interpretation of data analysis results using the SPSS program.
4.	PTE 8201 Vocational Education and Training Management	This course provides students with the knowledge to manage vocational education and training programs and develop electrical engineering training models. The subject matter of this course includes: identifying education and training needs, planning education and training designs, establishing methodologies, preparing materials, implementing training, evaluating education and training, formulating training follow-ups, and building learning organizations.
5.	PTE 8202 Curriculum Development of Vocational Education and Training	This course develops textual and contextual thinking in the curriculum development of vocational training and education. Students are invited to be willing and able to recognize a broad perspective of curriculum development before focusing on taking curriculum development, especially in vocational fields characterized by a competency-based curriculum. Curriculum components such as syllabus development, lesson plans, learning instruments are also discussed in this course.
6.	PTE 8203 Vocational Learning Model	This course develops contextual thinking (according to the characteristics of the study program) and elements of the Vocational Learning Model as a learning resource based on the real problems. The primary subject matter includes perception concepts, vocational learning models, functions, and benefits of vocational learning models and various life skills. In addition, it also examines vocational maturity learning and learning for vocational education for those with special needs.

No.	Code & Course	Course Description
7.	PTE 8204 Vocational Learning Assessment	This course provides knowledge and skills to evaluate student learning outcomes in terms of attitudes, knowledge, and skills. The lectures start from the concept of measurement, assessment, and evaluation; assessment reference; learning outcome evaluation instruments; development of learning outcome evaluation instruments; instrument quality analysis; implementation of learning outcome evaluation, processing of measurement and assessment results; administration and reporting, and utilization trends in learning assessment.
8.	PTE 8205 Electric Power System	The course discusses the basic concepts of electric power systems, the electric power system components, sources of electrical energy, electrical grids, electric power distribution, electric power substations, and implementation of electric power systems through field studies.
9.	PTE 8206 Electrical Energy Management	This course fosters contextual thinking about managing electrical energy on the generator side and load side and develops instructional learning activities in the vocational education and training program in electrical engineering, which include: basic principles of electrical energy management, electrical energy management planning, electrical energy efficiency on the generator side, application of electrical energy audits to loads based on the applicable standard procedures and requirements, and calculation of the efficiency in the use of electrical energy at loads.
10.	PTE 8207 Electric Power Automation System	This course develops contextual thinking and elements of automation systems in electric power engineering, which include: plant system identification, plant system modeling, automation system design, SCADA-based automation systems, and real-time systems. This lecture also examines remote terminal units (RTU), master terminal units (MTU), integrated instrumentation systems, SCADA pipelines, and SCADA in transmission systems and power plants.
11.	PTE 8208 Electrical Protection System	This course will develop comprehensive thinking on protection philosophy, protection relays, overcurrent relays, distance relays, differential relays, voltage relays, power relays, directional relays, generator protection, transformer protection, transmission network protection, distribution network protection, motor protection, disturbance analysis, and protection systems, and the study of the implementation of electric power design in the field.
12.	PTE 8209 Utilization of Electrical Energy	This course provides instructional management knowledge and skills and their application practice in electrical engineering vocational education and training programs on the use of primary energy into electrical energy, electrical energy management from the generation to the consumer side through energy management steps and performance of renewable energy, equipment of lighting, cooling, heating, electric machines, Program Logic Control (PLC)-based electric machine control, and electrical installations in the utilization of electrical energy.
13.	PTE 8110 Thesis Proposal	This course prepares a thesis proposal writing based on scientific research in electrical engineering vocational education and training, which includes: thesis writing rules, academic writing, strategies for writing Chapter I: Introduction, strategies for writing Chapter II: Literature Review, Strategies for writing Chapter III, and Strategies to develop research instruments.

No.	Code & Course	Course Description
14.	PTE 8211 Thesis Proposal and Seminar	This course prepares and implements a written thesis proposal seminar. The lecture begins with reviewing the thesis proposal writing, seminar presentation strategies, and similarity examination of a thesis proposal. A thesis proposal seminar is then carried out in a panel with a minimum of one student per face-to-face meeting.
15.	PTE 8112 Scientific Papers Writing	This course develops strategies for writing scientific papers in the form of journal articles based on the national and international standards, which include: types and forms of scientific work, stimulating the writing ideas, truth and scientific method, structure of scientific articles, in-house style, language for scientific papers, ethics and code of ethics, literature review search techniques, article uploading techniques to the open-access journal system (OJS). This course also examines strategies to publish in accredited national and international journals, preparing scientific presentations at international forums, and strategies for implementing the presentations.
16.	PTE 8613 Thesis	This course provides scientific research experiences in the field after carrying out a thesis proposal seminar followed by research preparation, data collection, data analysis, research report writing, and a thesis defense.
17.	PTE 8214 E-Instructional Design	This course develops skills in planning education and training programs based on information/communication technology and computers, which include: planning/developing learning based on the latest information/communication technology (such as e-learning, mobile learning, virtual laboratory), e-instructional design, and e-instructional development model with the ADDIE approach and examples of its application in the field.
18.	PTE 8215 Leadership in Vocational and Educational Training	This course provides leadership management skills in vocational education and training institutions, including leadership management, effective leadership, leadership, leaders, and leadership in education and training.
19.	PTE 8216 Professional Development of Vocational Educator	This subject discusses the principles of human resource development, professional development, professional development to improve school quality, the concept of continuous professional development; evaluates teacher professional development, analyzes teacher professional development policies; analyzes teacher professional development policies and quality assurance; explains the performance evaluation model of professional educators, professional development models and vocational educator careers; and carries out case studies of professional development of vocational educators.
20.	PTE 8217 Vocational Psychology	This subject discusses an introduction to vocational psychology, career development theory, new perspectives on work and career activities, research in vocational psychology, career counseling and other career interventions, and the development of vocational career assessment instruments. Besides, it will also present empirical literature on vocational psychology and the application of psychological principles to problems of vocational option, selection, and training.

No.	Code & Course	Course Description
21.	PTE 8218 Occupational Health and Safety in Electricity	This course provides knowledge and skills about Occupational Health and Safety in electricity based on ZEROSICKS, aspects of electrical hazards, personal protective equipment, protection, and grounding, work safety handling procedures, medical aspects of electrical hazards, Occupational Health and Safety in electrical equipment, and Works in Voltage Conditions to avoid the risks of fire and electrical shock, equipped with a learning model.
22.	PTE 8219 Management of Electrical Engineering Vocational Laboratory	This course improves the ability to plan and design laboratory/workshop facilities and infrastructure based on the standards, implement work safety, manage facility procurement, administer facilities, manage learning services, maintain and repair facilities, and maintain quality assurance in electrical engineering laboratories and workshops.
23.	PTE 8220 Optimal Design of Electric Power	This course discusses methodologies in planning and automation design, electric power perspective automation design, various tasks and activities in automation planning, variations in automation design, specifications and requirements for TL automation systems, smart system planning, identification of TL automation planning needs, case studies of OTL planning, evaluation, and validation of TL automation planning.
24.	PTE 8221 Computation of Electrical Power	This course discusses the concepts of problem-solving, algorithmic problem analysis, planning and development of computational techniques through a programming language, and interpretation of the analysis results of computer programs for electric power. It provides insights into (1) solving problems in electricity based on the analysis, (2) creating a flow chart for solving electric power problems based on algorithms, (3) developing a simple application for solving electric power problems through a program, and (4) interpreting the computational results of electric power problem-solving.
25.	PTE 8222 Intelligent Control System	This course discusses control systems for control machines and electronic/electrical equipment and helps implement various control processes by prioritizing the principles of improving the performance of intelligent control systems based on the fuzzy logic, artificial neural networks (ANN), and genetic algorithms (AG), both software and hardware-software.



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