Course Code	TKEE165112
Course Name	Transient Analysis
Course Instructors	T. Haryono, Harry Prabowo, Lesnanto Multa Putranto
Course Type	Selected Elective
Course Classification	Engineering Topics
Credit / Contact Hour per Week	3 / 150 minutes per Week
Course Description	For students to know the nature of the various combinations of electrical components, which form the system. So that if there is a certain input specific outputs can be known. Furthermore, with the responses obtained, the student can provide an assessment of whether the response form is reasonable, needs attention or dangerous. Besides, it is desirable that students become accustomed to using software to analyze transients, such as EMTP or EMTP DC
Prerequisites Courses	-
Covered Student Outcome	**Development of Engineering Solution (b)**

Learning Outcome	1. Student are able to understand the importance of transients in power system. 2. Students are able to understand measures to protect electrical equipment from damage due to transient. 3. Students are able to understand the method of transient calculation in theory as well as by using software. 4. Students are able to understand how to dampen transient
Topic	1. Introduction 2. Basics Electrical Transient a. Circuit Parameters b. Circuit Characteristics 3. Laplace Transformation a. Concept b. Simple Application c. Other Transformation d. Operational Impedance 4. Simple Transient Circuit a. Transient of Close Circuit b. Transient Recovery c. Transient Double Frequency 5. Electric Transient Damping a. Review of RLC's circuit b. RLC's series circuit c. General Damping Curve d. Load Switching 6. 3-Phase Circuit Transient a. The importance of type Neutral connection b. Switching a 3-Phase Reactor c. 3-Phase Capacity Switching 7. Relationship with Transformator Y-Δ 8. Lightning Strike a. Lightning Strike Coverage b. The Physical phenomenon of Lightning Strike c. Interaction between Lightning Strike and Power System 9. Midterm Exam 10. Performance of Winding in Transient Condition a. Initial Voltage Distribution b. Winding Oscillation c. Travelling Solution d. Behaviour of a Transformer Core in Surge Condition 11. Equipment and System Protection Against More Transient Voltage a. Basic of Protection b. Lightning and Surge Compressor c. Surge Capacitor and Surge Reactor d. Transient Voltage and Grounding Practices

<table>
<tr><td></td><td>e. Scheme of Surge Protection for a Industrial Drive System
12. Transient in Integrated Power System
a. Short Wire and Kilometric Disorders
b. Voltage Drop and Load Release
c. Transient Voltage at Closing and Closing Back Channels
d. Induction of Over Voltage
e. Surge Relationship in an Integrated System
f. Transient in the Industrial Power Network
13. System and Circuit Parameters for Transient Calculation
a. Transient Parameter Values for Transformers and Reactors
b. Transient Parameter Values for Generator
c. Transient Parameter Values for Transmission and Cable channels
d. Bus Working Characteristics
14. Equipment for Measuring Transient
a. General Overview in Transient Measurement
b. Magnetic Oscillograph
c. Equipment for Measuring Transient Currents)
d. Transient Voltage Gauge e. Equipment for Measuring Random Noise
f. Sphere Gap
15. Surge Measurement and Testing Technique
a. Minimizing Interference Issues
b. Differential Measurement
c. High Frequency Transient Measurement
d. Measuring Transient Response of a System
e. Impulse Testing
16. Modeling Power Equipment
a. Transformator Modelling
b. Generator Modelling
c. Motor Modelling
d. Air Transmission Channel Modelling
e. Cable Modelling
17. Final Exam</td></tr>
<tr><td>Direct Asessment</td><td><table><tr><th>Direct Asessment Plan</th><th>Measured Learning Outcome</th></tr><tr><td>Homework</td><td>LO1,LO2,LO3,LO4</td></tr><tr><td>Mid Exam</td><td>LO1,LO2</td></tr><tr><td>Final Exam</td><td>LO3,LO4</td></tr><tr><td></td><td></td></tr></table></td></tr>
<tr><td>Indirect Assesment</td><td>Questionnaire (EDOM)</td></tr>
<tr><td>References</td><td>[1] Allan Greenwood, Electrical Transients in Power Systems, Wiley-Interscience , John Wiley & Sons.Inc, 1971
[2] Ronald N.Bracewell, The Fourier Transform and Its Applications, Mc-Graw Hill Book, Singapore, 1985
[3] Allan Greenwood, Electrical Transients in Power System, John Wiley & INC, Canaca, 1991.</td></tr>
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