



MODULE HANDBOOK DESCRIPTION

Module designation	Electrical Measurement	
Code	FBS2123	
Semester(s) in which the module is taught	3 / second year	
Person responsible for the module	Dr. I Made Ginarsa, S.T.,M.T.	
Language	Indonesian	
Relation to curriculum	Compulsory	
Teaching methods	Lecture, small group discussion, case base method.	
Workload (incl. contact hours, self-study hours)	Contact minutes every week, each week of the 16 weeks/semester : <ul style="list-style-type: none"> ● Lectures: 2·50 minutes ● Exercises and Assignments: 2·60 minutes ● Private study: 2·60 minutes. Total study hours = 5 hours 40 minutes/week	
Credit points	2 (~ 3,2 ECTS)	
Required and recommended prerequisites for joining the module	-	
Module objectives/intended learning outcomes	1. Students are able to explain the concepts of electrical measurements, unit systems. 2. Students are able to use the electrical measurements tools such as: Voltmeter, Ampere-meter, etc.	PLO2
	3. Students are able to interpret and analyse the results from many measurement tools. 4. Students are able to calibrate the measurement equipment and calculate/convert to other units in DC/AC.	PLO2 and PLO3
	5. Students are able to apply knowledge and engineering analysis of electrical measurements as a basis for starting a business independently and building a technology-based business network	PLO8

Content	<p>Unit system on electrical engineering such as: Ampere, voltage, ohm. Instruments for direct current (DC) measurement: Galvanometer, torque and deflection of galvanometer, steady state deflection, dynamic behaviour of galvanometer, mechanism of permanent magnet moving coil (PMMC). Galvanometer sensitivity, voltmeter DC, Ampere-meter DC, ohm metre. Instrument for alternating current (AC), electro-dynamo-metre, moving iron instrument, voltmeter electrostatic, rectifier-type instrument, rectifier circuit, multimeter circuit, Decibel measurement, thermo-instrument, thermocouple-instrument, heat-to-watt direct converter, electric power measurement, 1-phase wattmeter, multi/3-phase wattmeter, Blondel theorem. Reactive power measurement, watt-jam metre (kWh) metre, power factor (cos phi) measurement, frequency measurement, transformer instruments, PT, CT and their wiring. Potentiometer, principle of potentiometer, elementary circuit of potentiometer, potentiometer single scale, potentiometer multi scale, volt box, shunt box, voltmeter and Ampere-metre calibrations. Direct current bridge, Wheatstone bridge, basic operation, measurement error, Thevenin equivalent circuit, Kelvin bridge, double Kelvin bridge, Murray loop test, Varley loop test, Wheatstone bridge with protection. Alternating current (AC) bridge, basic operation and balancing, capacitance comparison bridge, inductance comparison bridge, Maxwell bridge, Hay bridge, Schering bridge. Oscilloscope, basic principle, components of oscilloscope.</p>
Examination forms	- Multiple choice examination and essay,
Study and examination requirements	<p>The final grade in the module is composed of:</p> <ol style="list-style-type: none"> a. Per-meeting score = 5 % · 16 meeting = 80% b. Exercise Report/ Homework/Portofolio = 20% <p>Students must have a final grade of 65% or higher to pass</p>
Reading list	<ol style="list-style-type: none"> 1. W.D. Cooper Instrumentasi Elektronik dan Teknik Pengukuran, Erlangga, Jakarta, 2018. 2. S. Waluyanti, Alat Ukur dan Teknik Pengukuran, Departemen Pendidikan Nasional. 2008.