



Universitas Negeri Surabaya Faculty of Mathematics and Natural Sciences Undergraduate Physics Study Program

UNESA													
			SEI	MESTER	LEARNII	NG PL	_AN	1					
Courses			CODE		Course Famil	у	Cred	lit We	ight	SEMES	STER	Con	npilation e
Basic Electronic	s II		452010304	12	Compulsory S Program Subje	tudy ects	T=3	P=0	ECTS=4.77	7 4	1	Janu 2024	uary 22, 4
AUTHORIZATION	N		SP Develo	per		Course	Course Cluster Coordinator			Study Coordi	Progra nator	ım	
	Looming world Coop Studios			ndah Rahmawati, S.T., M.Si.			Drs. Imam Sucahyo, M.Si.			Prof. D	Prof. Dr. Munasir, S.Si., M.		.Si., M.Si
Learning model	Case Studies												
Program	PLO study prog	gram	that is char	ged to the cour	se								
Learning Outcomes (PLO)	PLO-3	Deve	elop logical, cı ordance with w	ritical, systematic a ork competency s	and creative thin standards in the	king in carr field conce	ying o	ut spe	ecific work in	their field	of exp	ertise	and in
	PLO-4	Deve	Develop yourself continuously and collaborate.										
	PLO-5	Able to demonstrate as a good scientist, critical thinking skills and innovation in research and professional fields.											
	PLO-7	Communicate their ideas and/or research results in academic writing and speaking effectively.											
	PLO-11	Design and conduct experiments in physics learning by applying scientific methods											
	PLO-13	Dem	nonstrate knov	vledge of Classica	l Physics and M	odern Phys	sics						
	Program Objectives (PO)												
	PO - 1	Effec	Students are able to explain the working principles and applications of Bipolar Junction Transistor (BJT), Junction Fielt Effect Transistor (JFET), amplifier circuits, power amplifier circuits, amplifier circuits with feedback, Operational Amplifier (op-amp), oscillator circuits and basics digital electronics.										
	PO - 2	Able to apply the correct Basic Electronics 2 concepts to obtain solutions to quantitative problems in physics.											
	PO - 3	Able to carry out Basic Electronics 2 practicum activities by applying scientific methods											
	PO - 4	Able to communicate the concepts and application of Basic Electronics 2 effectively during the learning process											
	PO - 5	Able	to work indep	endently effective	ly and collaborat	e in groups	on le	cture	and practicu	m assignn	nents		
	PO - 6	Able to demonstrate a scientific attitude and critical thinking in solving problems faced both academically and socially									ocially		
	PLO-PO Matrix												
			P.O	PLO-3	PLO-4	PLO-5		PL	D-7	PLO-11		PLO-1	.3
			PO-1										
			PO-2										
			PO-3										
			PO-4										
			PO-5										
			PO-6										
		<u> </u>											
	PO Matrix at the	e end	d of each lea	rning stage (Su	b-PO)								
			P.O				Wee	k					
				1 2 3	4 5 6	7 8	9	10	11 12	13	14	15	16

PO-1 PO-2 PO-3 PO-4 PO-5 PO-6

Short Co Descript			Basic Electronics 2 course covers the working principles and application of BJT transistors, JFET field effect transistors, op-amp racteristics and circuits, and basic digital electronics material.										
Referen	ces	Main :											
		2. Rahmawati, E., S 3. Rahmawati, E., S 4. Tooley, M. 2006	 Sutrisno. 1978. Elektronika 2. Teori dan Penerapannya. Penerbit ITB Bandung. Rahmawati, E., Sucahyo, I., dan Kholiq, A. 2017. Hand out Elektronika Dasar 2. Rahmawati, E., Sucahyo, I., dan Kholiq, A. 2017. Panduan Praktikum Elektronika Dasar 2. Tooley, M. 2006. Electronics Circuit: Fundamentals and Applications. Third Edition. Elesevier Ltd. Boylestad, R., and Nashelsky, L. Electronics Devices and Circuits: Theory. Seventh Edition. Prentice Hall. 										
		Supporters:											
		1. Floyd, T. L. 2012. Electronics Devices. Prentice Hall.											
Support lecturer	ing	Drs. Imam Sucahyo, M.S Dzulkiflih, S.Si., M.T. Abd. Kholiq, S.Pd., M.T. Endah Rahmawati, S.T., Meta Yantidewi, S.Si., M	M.Si.										
			Help Learning,										

Week-		Evaluation		Learr Studer	lp Learning, ning methods, nt Assignments, timated time]	Learning materials [References	Assessment Weight (%)
	(Sub-PO)	Indicator	Criteria & Form	Offline (offline)	Online (online)	1	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

	•			,			
1	1.Able to master the	1.Identify problem	Criteria:	Form:	Materia		1%
	working principles	cases	Complete	Classical	Bipolar		
	of BJT transistors	2.Identify the	assignments	classroom	Junctio		
	2.Able to apply BJT	concept/working	completely		Transis		
	transistors as	principle of the	Form of Assessment	Method: Case	Amplific	er	
	amplifiers.	BJT transistor		study	Circuit		
	3.Able to analyze	and relate it to	Participatory Activities		Library		
	data with precise	the problem	i articipatory Activities	Student	Sutrisn	0.	
		•		assignment:	1978.		
	explanations, and	case		Determine an	Electro		
	conclusions based	3.Analyze		amplifier	Theory		
	on data and	problems and		circuit with a	Applica		
	guided/independent	apply the		certain gain	ITB Ba		
	analysis for	working		value. Case	Publish	ier.	
	learning	principles of BJT		study.			
		transistors to		If a circuit	Materia	al:	
		solve problems		requires 10	Bipolar		
				times	Junctio	n	
				amplification,	Transis	stor,	
				what would	Amplific		
				the circuit be	Circuit		
				like and how	Refere	nce:	
				to determine	Rahma		
				the value of	E., Suc		
				each	I., and		
				component.	A. 2017		
				(3 x 50	Basic		
				minutes)	Electro	nics	
					Hand o		
					Materia		
					Bipolar		
					Junctio		
					Transis		
					Amplific	er	
					Circuit		
					Library		
					Tooley,	, M.	
					2006.	.	
					Electro		
					Circuit:		
						mentals	
					and		
					Applica		
					Third E		
					Elesevi	er Ltd.	
					Materia		
					Bipolar		
					Junctio		
					Transis		
					Amplific	er	
					Circuit		
					Library		
					Boylesi	.au, K.,	
					and Nashel	ichy I	
					Electro		
					Device. Circuits		
					Theory		
					Sevent		
					Sevent Edition		
					Edition. Prentic		
					Prenuc	o man.	
					Materia		
					Bipolar		
					Junctio		
					Transis		
					Amplific	er	
					Circuit		
					Library		
					Floyd		
					2012.		
					Electro	nics	
					Device		
				I I	Prentic		
					I FIEIIII.	е нап. Т	

				1	T	
2	1.Able to master the	1.Identify problem	Criteria:	Form:	Material:	4%
	working principles	cases	Complete	Classical	Bipolar	
	of BJT transistors	2.Identify the	assignments completely	classroom	Junction	
	2.Able to apply BJT	concept/working	Completely		Transistor,	
	transistors as	principle of the	Form of Assessment	Method: Case	Amplifier	
	amplifiers.	BJT transistor	:	study	Circuit	
	3.Able to analyze	and relate it to	Participatory Activities		Library:	
	data with precise	the problem	, , , , , , , , , , , , , , , , , , , ,	Student	Sutrisno.	
	explanations, and	case		assignment:	1978.	
	conclusions based	3.Analyze		Determine an	Electronics 2.	
	on data and	problems and		amplifier	Theory and	
	guided/independent	apply the		circuit with a	Application.	
	analysis for	working		certain gain value. Case	ITB Bandung Publisher.	
					Publisher.	
	learning	principles of BJT		study.		
		transistors to		If a circuit requires 10	Material:	
		solve problems		times	Bipolar	
				amplification,	Junction	
				what would	Transistor,	
				the circuit be	Amplifier	
				like and how	Circuit	
				to determine	Reference:	
				the value of	Rahmawati,	
				each	E., Sucahyo,	
				component.	I., and Kholiq, A. 2017.	
				(3 x 50	A. 2017. Basic	
				minutes)	Electronics	
					Hand out 2.	
					rianu out Z.	
					Material:	
					Bipolar Junction	
					Transistor,	
					Amplifier	
					Circuit	
					Library:	
					Tooley, M.	
					2006.	
					Electronics	
					Circuit:	
					Fundamentals	
					and	
					Applications.	
					Third Edition.	
					Elesevier Ltd.	
					Licsevier Ltd.	
					Material:	
					Bipolar	
					Junction	
					Transistor,	
					Amplifier	
					Circuit	
					Library:	
					Boylestad, R.,	
					and	
					Nashelsky, L.	
					Electronics	
					Devices and	
					Circuits:	
					Theory.	
					Seventh	
					Edition.	
					Prentice Hall.	
					Material:	
					Bipolar	
					Junction	
					Transistor,	
					Amplifier	
					Circuit	
					Library:	
					Floyd, TL	
					2012.	
					Electronics	
					Devices.	
					Prentice Hall.	
				ļ		

					_	
4	1. Able to understand and master the basics of feedback circuits (positive and negative) 2. Able to apply the basics of feedback circuits appropriately to obtain solutions to contextual problems 3. Able to carry out practical activities in accordance with systematic procedures or procedures to solve problems that involve careful observation and measurement as well as scientific hypotheses 4. Able to work independently effectively or collaborate in lecture assignment groups in the Basic Electronics 2 course 5. Able to analyze data with precise explanations, and conclusions based on data and guided/independent analysis for learning	1.Identify problem cases 2.Identify the concept of feedback loops (positive and negative) and relate them to problem cases 3.Analyze problems with mathematical formulas and apply them	Criteria: 1.Complete assignments completely 2.Carrying out a complete series of practicums (pre-lab, data collection, reports). Form of Assessment : Participatory Activities, Practical Assessment	Form: Classical classroom Method: Case study and practicum (reinforcement with negative feedback) (3 x 50 minutes)	Material: Power amplifier Reference: Sutrisno. 1978. Electronics 2. Theory and Application. ITB Bandung Publisher. Material: Power amplifier Reference: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Hand out 2. Material: Power amplifier Reference: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Practical Guide 2. Material: Power amplifier Reference: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Practical Guide 2. Material: Power amplifier Reference: Circuit: Fundamentals and Applications. Third Edition. Elesevier Ltd.	

5	1. Able to understand and master the basics of feedback circuits (positive and negative) 2. Able to apply the basics of feedback circuits appropriately to obtain solutions to contextual problems 3. Able to carry out practical activities in accordance with systematic procedures or procedures or procedures to solve problems that involve careful observation and measurement as well as scientific hypotheses 4. Able to work independently effectively or collaborate in lecture assignment groups in the Basic Electronics 2 course 5. Able to analyze data with precise explanations, and conclusions based on data and guided/independent analysis for learning	1.Identify problem cases 2.Identify the concept of feedback loops (positive and negative) and relate them to problem cases 3.Analyze problems with mathematical formulas and apply them	Criteria: 1.Complete assignments completely 2.Carrying out a complete series of practicums (pre-lab, data collection, reports). Forms of Assessment: Participatory Activities, Practical Assessment, Practical / Performance	Form: Classical classroom Method: Case study and practicum (reinforcement with negative feedback) (3 x 50 minutes)	Material: Power amplifier Reference: Sutrisno. 1978. Electronics 2. Theory and Application. ITB Bandung Publisher. Material: Power amplifier Reference: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Hand out 2. Material: Power amplifier Reference: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Prower amplifier Reference: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Clectronics Practical Guide 2. Material: Power amplifier Reference: Tooley, M. 2006. Electronics Circuit: Fundamentals and Applications. Third Edition. Elesevier Ltd.	5%

6	1.Able to master the	1.Identify problem	Criteria:	Form:	l N	Material:	5%
6	1. Able to master the working principles of JFET and its application 2. Able to apply JFET working principles correctly to obtain solutions to contextual problems. 3. Able to work independently effectively or collaborate in group lecture assignments in the Basic Electronics 2 course.	1.Identify problem cases 2.Identify the concept/principle of JFET work and relate it to the problem case 3.Analyze problems with mathematical formulas and apply them	Criteria: 1.Complete assignments completely 2.Carrying out a complete series of practicums (pre-lab, data collection, reports). Forms of Assessment: Participatory Activities, Practical Assessment, Practical / Performance	Form: Classical classroom Method: Case study and practicum (JFET reinforcement) (3 x 50 minutes)	(AALS) 1ETTALIS 1ETTALIS 1ETTALIS 1.ABEH N.(AARRELIAABEH N.(AARRELIAABEH T2ECOFAAAT	Material: JFET, JFET Amplifier) .ibrary: Sutrisno. 1978. Electronics 2. Theory and Application. TB Bandung Publisher. Material: JFET, JFET Amplifier) References: Rahmawati, E., Sucahyo, ., and Kholiq, A. 2017. Basic Electronics Hard out 2. Material: JFET, JFET Amplifier) References: Rahmawati, E., Sucahyo, ., and Kholiq, A. 2017. Basic Electronics Fractical Guide 2. Material: JFET, JFET Amplifier) References: Rahmawati, E., Sucahyo, ., and Kholiq, A. 2017. Basic Electronics Circuit: Flendamentals Cology, M. Coolo. Electronics Circuit: Fundamentals Amplifications. Chird Edition. Elesevier Ltd.	5%

7	1. Able to master the working principles of JFET and its application 2. Able to apply JFET working principles correctly to obtain solutions to contextual problems. 3. Able to work independently effectively or collaborate in group lecture assignments in the Basic Electronics 2 course.	1.Identify problem cases 2.Identify the concept/principle of JFET work and relate it to the problem case 3.Analyze problems with mathematical formulas and apply them	2.Carrying out a complete series of practicums (pre-lab, data collection, reports). Forms of Assessment: Participatory Activities, Practical Assessment, Practical / Performance	Form: Classical classroom Method: Case study and practicum (JFET reinforcement) (3 x 50 minutes)	Material: (JFET, JFET Amplifier) Library: Sutrisno. 1978. Electronics 2. Theory and Application. ITB Bandung Publisher. Material: (JFET, JFET Amplifier) References: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Hand out 2. Material: (JFET, JFET Amplifier) References: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Practical Guide 2. Material: (JFET, JFET Amplifier) References: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Practical Guide 2. Material: (JFET, JFET Amplifier) References: Tooley, M. 2006. Electronics Circuit: Fundamentals and Applications. Third Edition. Elesevier Ltd.	5%
8	Midterm Evaluation		Criteria: Complete the test well and correctly Form of Assessment: Portfolio Assessment, Test	Form: Written test with material from meetings 1-7 (2 x 50 minutes)		12%

	<u> </u>					
9	1. Mastering the working principles, characteristics and application of Op-Amp 2. Able to apply op-amps in circuits appropriately to obtain solutions to contextual problems. 3. Able to carry out practical activities in accordance with systematic procedures or procedures to solve problems that involve careful observation and measurement 4. Able to work independently effectively or collaborate in lecture assignment groups in the Basic Electronics 2 course 5. Able to analyze data with precise explanations, and conclusions based on data and guided/independent analysis for learning	1.Identify problem cases 2.Identify the concept/working principle, characteristics and application of Op-Amp and relate it to the problem case 3.Analyze problems with mathematical formulas and apply them	Criteria: 1.Complete assignments completely 2.Carrying out a complete series of practicums (pre-lab, data collection, reports). Forms of Assessment: Participatory Activities, Practical Assessment, Practical / Performance	Form: Classical classroom Method: Case study and practicum (application of Op-Amps for inverting and non-inverting amplifiers) (3 x 50 minutes)	Material: (Op-Amp) Library: Sutrisno. 1978. Electronics 2. Theory and Application. ITB Bandung Publisher. Material: (Op-Amp) References: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Bassic Electronics Hand out 2. Material: (Op-Amp) References: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Hand out 2. Material: (Op-Amp) References: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Practical Guide 2. Material: (Op-Amp) References: Tooley, M. 2006. Electronics Circuits: Fundamentals and Applications. Third Edition. Elesevier Ltd. Material: (Op-Amp) References: Boylestad, R., and Nashelsky, L. Electronics Devices and Circuits: Theory Seventh Edition. Prentice Hall.	5%

			1			
10	1.Mastering the working principles, characteristics and application of Op-Amp 2.Able to apply op-amps in circuits appropriately to obtain solutions to contextual problems. 3.Able to carry out practical activities in accordance with systematic procedures or procedures to solve problems that involve careful observation and measurement 4.Able to work independently effectively or collaborate in lecture assignment groups in the Basic Electronics 2 course 5.Able to analyze data with precise explanations, and conclusions based on data and guided/independent analysis for learning	1.Identify problem cases 2.Identify the concept/working principle, characteristics and application of Op-Amp and relate it to the problem case 3.Analyze problems with mathematical formulas and apply them	Criteria: 1.Complete assignments completely 2.Carrying out a complete series of practicums (pre-lab, data collection, reports). Forms of Assessment: Participatory Activities, Practical Assessment, Practical / Performance	Form: Classical classroom Method: Case study and practicum (application of Op-Amps for inverting and non-inverting amplifiers) (3 x 50 minutes)	Material: (Op-Amp) Library: Sutrisno. 1978. Electronics 2. Theory and Application. ITB Bandung Publisher. Material: (Op-Amp) References: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Hand out 2. Material: (Op-Amp) References: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Factical Guide 2. Material: (Op-Amp) References: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Fractical Guide 2. Material: (Op-Amp) References: Tooley, M. 2006. Electronics Circuits: Fundamentals and Applications. Third Edition. Elesevier Ltd. Material: (Op-Amp) References: Boylestad, R., and Nashelsky, L. Electronics Devices and Circuits: Theory . Seventh Edition. Prentice Hall.	5%

11	1.Mastering the	1.Identify problem				
	working principles,	cases	Criteria: 1.Complete	Form: Classical	Material: (Op-Amp)	5%
	characteristics and	Identify the	assignments	classroom	Library:	
	application of Op-	concept/working	completely	Method: Case study and	Sutrisno. 1978.	
	Amp	principle,	2.Carrying out a	practicum	Electronics 2.	
	2.Able to apply op-	characteristics	complete series	(application of	Theory and	
	amps in circuits	and application	of practicums	Op-Amps for	Application.	
	appropriately to	of Op-Amp and	(pre-lab, data collection,	inverting and	ITB Bandung	
	obtain solutions to contextual	relate it to the problem case	reports).	non-inverting	Publisher.	
	problems.	3.Analyze	reports).	amplifiers)		
	3.Able to carry out	problems with	Forms of	(3 x 50 minutes)	Material:	
	practical activities	mathematical	Assessment :	minutes)	(Op-Amp) References:	
	in accordance with	formulas and	Participatory		Rahmawati.	
	systematic	apply them	Activities, Practical Assessment, Practical		E., Sucahyo,	
	procedures or		/ Performance		I., and Kholiq,	
	procedures to solve		/ I criomianec		A. 2017.	
	problems that				Basic	
	involve careful				Electronics Hand out 2.	
	observation and				nanu uul 2.	
	measurement 4.Able to work				Material:	
	independently				(Op-Amp)	
	effectively or				References:	
	collaborate in				Rahmawati,	
	lecture assignment				E., Sucahyo,	
	groups in the Basic				I., and Kholiq,	
	Electronics 2				A. 2017. Basic	
	course				Electronics	
	Able to analyze				Practical	
	data with precise				Guide 2.	
	explanations, and					
	conclusions based				Material:	
	on data and guided/independent				(Op-Amp)	
	analysis for				References:	
	learning				Tooley, M. 2006.	
	icariiig				Electronics	
					Circuits:	
					Fundamentals	
					and	
					Applications.	
					Third Edition. Elesevier Ltd.	
					LICSCVICI LIU.	
					Material:	
					(Op-Amp)	
					References:	
					Boylestad, R.,	
					and	
					Nashelsky, L. Electronics	
					Devices and	
					Circuits:	
					Theory .	
					Seventh	
					Edition.	
			l	1	Prentice Hall.	

10		1.1	Outrait -	E		001
12	1.Able to master the working principles of several oscillator circuits (RC, LC, crystal) 2.Able to apply the concept of oscillator circuits correctly to obtain solutions to contextual problems. 3.Able to carry out practical activities in accordance with systematic procedures or procedures to solve problems that involve careful observation and measurement as well as scientific hypotheses 4.Able to work independently effectively or collaborate in lecture assignment groups in the Basic Electronics 2 course 5.Able to analyze data with precise explanations, and conclusions based on data and guided/independent analysis for learning and/or research	1.Identify problem cases 2.Identify the concept/working principle of several oscillator circuits (RC, LC, crystal) and relate them to problem cases 3.Analyze problems with mathematical formulas and apply them	Criteria: 1.Complete assignments completely 2.Carrying out a complete series of practicums (pre-lab, data collection, reports). Forms of Assessment : Participatory Activities, Practical Assessment, Practical / Performance	Form: Classical classroom Method: Case study and practicum (Wien bridge RC oscillator) (3 x 50 minutes)	Material: (Oscillator) Library: Sutrisno. 1978. Electronics 2. Theory and Application. ITB Bandung Publisher. Material: (Oscillator) References: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Hand out 2. Material: (Oscillator) References: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Padicalian (Oscillator) References: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Practical Guide 2. Material: (Oscillators) References: Tooley, M. 2006. Electronics Circuits: Fundamentals and Applications. Third Edition. Elesevier Ltd. Material: (Oscillators) References: Boylestad, R., and Nashelsky, L. Electronics Devices and Circuits: Theory Seventh Edition. Prentice Hall.	6%

					<u> </u>	-	
13	1.Students can understand the basics of digital electronics (number conversion, logic gates, binary code decimal (BCD). 2.Able to apply digital electronics concepts appropriately to obtain solutions to contextual problems 3.Able to carry out practical activities in accordance with systematic procedures or procedures to solve problems that involve careful observation and measurement as well as scientific hypotheses 4.Able to work independently effectively or collaborate in lecture assignment groups in the Basic Electronics 2 course 5.Able to analyze data with precise explanations, and conclusions based on data and guided/independent analysis for learning and/or research	1.Identify problem cases 2.Identify the basic concepts of digital electronics and relate them to problem cases 3.Analyze problems with mathematical formulas and apply them	Criteria: 1.Complete assignments completely 2.Carrying out a complete series of practicums (pre-lab, data collection, reports). Forms of Assessment: Participatory Activities, Practical Assessment, Practical / Performance	Form: Classical classroom Method: Case study and practicum (digital electronics) Student assignments: 1) Work on the questions in the book 2) Carry out practical activities according to the topic (3 x 50 minutes)	(dig elec Lib Sut 197 Ele The Appl ITE Pull Ma (dig elec Ret Rai E., I., a A. 2 Bass Ele Circ Fur and Appl Thi	ectronics 2. eory and plication. B Bandung blisher. eterial: gital gital ectronics) eferences: electronics ectronics end out 2. eterial: gital ectronics ectronics end out 2. eterial: gital ectronics ectr	7%

14	1.Students can understand the basics of digital electronics (number conversion, logic gates, binary code decimal (BCD). 2.Able to apply digital electronics concepts appropriately to obtain solutions to contextual problems 3.Able to carry out practical activities in accordance with systematic procedures or procedures to solve problems that involve careful observation and measurement as well as scientific hypotheses 4.Able to work independently effectively or collaborate in lecture assignment groups in the Basic Electronics 2 course 5.Able to analyze data with precise explanations, and conclusions based on data and guided/independent analysis for learning and/or research	1.Identify problem cases 2.Identify the basic concepts of digital electronics and relate them to problem cases 3.Analyze problems with mathematical formulas and apply them	Criteria: 1.Complete assignments completely 2.Carrying out a complete series of practicums (pre-lab, data collection, reports). Forms of Assessment: Participatory Activities, Practical Assessment, Practical / Performance	Form: Classical classroom Method: Case study and practicum (digital electronics) Student assignments: 1) Work on the questions in the book 2) Carry out practical activities according to the topic (3 x 50 minutes)	(del Li Sister Tri Ajr Po M (del R: R.E.I., A.B.EI H.A.B.EI Pro M (del R: R.E.I., A.B.EI Pro M (del R: R.E.I., A.B.EI Pro M (del R: R.E.I., A.B.EI Pro M (del R: R.E.I., A.B.EI Pro M (del R: R.E.I., A.B.EI Pro M (del R: R.E.I., A.B.EI Pro M (del R: R.E.I.), A.B.EI Pro M (del R: R: R: R: R: R: R: R: R: R: R: R: R:	laterial: digital lectronics) ibrary: utrisno. 978. lectronics 2. heory and pplication. FB Bandung ublisher. laterial: digital lectronics) eferences: ahmawati, ., Sucahyo, , and Kholiq, . 2017. asic lectronics lectronics) eferences: ahmawati, ., Sucahyo, , and Kholiq, . 2017. asic lectronics lectronics eferences: ahmawati, ., Sucahyo, , and Kholiq, . 2017. asic lectronics lectronics racticum digital	6%

15	1.Students can understand the basics of digital electronics (number conversion, logic gates, binary code decimal (BCD). 2.Able to apply digital electronics concepts appropriately to obtain solutions to contextual problems 3.Able to carry out practical activities in accordance with systematic procedures or procedures or procedures to solve problems that involve careful observation and measurement as well as scientific hypotheses 4.Able to work independently effectively or collaborate in lecture assignment groups in the Basic Electronics 2 course 5.Able to analyze data with precise explanations, and conclusions based on data and guided/independent analysis for learning and/or research	1.Identify problem cases 2.Identify the basic concepts of digital electronics and relate them to problem cases 3.Analyze problems with mathematical formulas and apply them	Criteria: 1.Complete assignments completely 2.Carrying out a complete series of practicums (pre-lab, data collection, reports). Forms of Assessment: Participatory Activities, Practical Assessment, Practical / Performance	Form: Classical classroom Method: Case study and practicum (digital electronics) Student assignments: 1) Work on the questions in the book 2) Carry out practical activities according to the topic (3 x 50 minutes)	Material: (digital electronics) Library: Sutrisno. 1978. Electronics 2. Theory and Application. ITB Bandung Publisher. Material: (digital electronics) References: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Hand out 2. Material: (digital electronics) References: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Practicum Guide 2. Material: (digital electronics) References: Rahmawati, E., Sucahyo, I., and Kholiq, A. 2017. Basic Electronics Practicum Guide 2. Material: (digital electronics Practicum Guide 2. Material: (digital electronics Fracticum Guide 2. Tooley, M. 2006. Electronics Tooley, M. 2006. Electronics Tirudamentals Applications. Third Edition. Elesevier Ltd.	7%
16	End of Semester Evaluation		Criteria: Complete the test well and correctly Form of Assessment : Test	Form: Written test with meeting material 9-15 (2 x 50 minutes)		13%

Evaluation Percentage Recap: Case Study

∟va	Evaluation Fercentage Recap. Case 3						
No	Evaluation	Percentage					
1.	Participatory Activities	30.85%					
2.	Portfolio Assessment	6%					
3.	Practical Assessment	22.85%					
4.	Practice / Performance	20.35%					
5.	Test	19%					
	•	00 N50%					

Notes

- Learning Outcomes of Study Program Graduates (PLO Study Program) are the abilities possessed by each Study Program
 graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program
 obtained through the learning process.
- 2. The PLO imposed on courses are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
- Program Objectives (PO) are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
- 4. Subject Sub-PO (Sub-PO) is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
- 5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
- Assessment Criteria are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
- 7. Forms of assessment: test and non-test.
- 8. Forms of learning: Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.

- 9. Learning Methods: Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.

 10. Learning materials are details or descriptions of study materials which can be presented in the form of several main points and
- The assessment weight is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
 TM=Face to face, PT=Structured assignments, BM=Independent study.