

Universitas Negeri Surabaya Faculty of Engineering, Electrical Engineering Undergraduate Study Program

Document Code

SEMESTER LEARNING PLAN

											1								
Courses			CODE				Cou	irse Fa	amily	/	Cre	dit We	eight		SEME	STER	Co Dat	mpilati :e	ion
IoT System*			202010234	2020102346 Compulsory S Program Sub							rs=0	5 July 17, 2024		024					
AUTHORIZATION			SP Develo	SP Developer				ubje	Course Cluster Coordinator				Study Program Coordinator						
			Zuhri, S.T.,	Dr. Lilik Anifah, S.T., M.T.; Dr. Syarifudien Zuhri, S.T., M.T.; Parama Diptya Widayaka S.ST., M.T.;					Prof. Bambang Suprianto			nto	Dr. Lusia Rakhmawati, S.T., M.T.		i.т.,				
Learning model	Project Based L	.ear	ning							1									
Program	PLO study pro	gra	m which is cha	arge	d to	the c	course												
Learning Outcomes	Program Object	ctiv	es (PO)	PO)															
(PLO)	PO - 1	Ał	ole to apply IoT to	o solv	ve pro	oblem	ns in the	engin	eerin	g field									
	PO - 2		ole to apply engi T systems	neeri	ing p	rincip	les, ide	ntify, fo	rmul	ate an	d ana	lyze d	ata/in	forma	tion to	solve	proble	ems us	sing
	PLO-PO Matrix	(
	PO Matrix at th	ie e	P.O PO-1 PO-2 end of each lea P.O PO-1 PO-2	rning 1	g sta	age (\$	1 1)) 5 6	7	8	Wee 9	k 10	11	12	13	14	15	16	
Short Course Description	Internet of Thing with understandi simple IoT infras to the internet ar Student Centere referred to before	ng a truc nd l d Le	and experience in ture starting fron oT as a platform earning (SCL) so	n des n noc as a o that	signin le de a prov t stud	ig IoT vices vider lents	-based that fui of data	applica oction a storag	ation as se e an	systen ensors d mana	ns. Th and a ageme	e disc ccuato ent se	ussio ors, ga rvices	n in th ateway . The	nis lect /s as c learnir	ure is a ommui ng mod	about nicatio lel de	buildin on brid velope	ig a ges d is
References	Main :																		
	 Qusay F Applicati Maneesl build exc 	F. H ons h R	chael F. 2019. U lassan, Atta ur . CRC Press. ao. 2018. Interne g IoT project. Par	Rehr et of	nan I Thing	Khan gs wi	, Sajjao	IA. M	adan	ii. 2018	3. Inte	ernet	of Thi	ings:	Challe	nges, A			
	Supporters:		lition vor																
	I. Jurnal pe	ene	litian yang releva	u'i															
Supporting lecturer	Dr. Nurhayati, S. Dr. Lilik Anifah, S Parama Diptya V Sayyidul Aulia Al	S.T., Vida	, M.T. ayaka, S.ST., M.1	Г.															

Week-	Final abilities of each learning stage	Eval	uation	Learr Studen	p Learning, ing methods, t Assignments, timated time]	Learning materials [References	Assessment Weight (%)
	(Sub-PO)	Indicator	Criteria & Form	Offline(<i>offline</i>)	Online (<i>online</i>)	1	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of sensors.	1.Actively searching for literature2.Active in discussions	Criteria: Activeness in group discussions Individual formative test results Form of Assessment : Participatory Activities	Lectures and discussions 2 X 50		Material: Introduction to IoT Library: Material: Introduction to IoT Reader: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects. Packt Publishing.	5%
2	 Able to apply loT (monitoring and control) using the LM-35 sensor (temperature sensor) to solve problems in the engineering field Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an loT system using a combination of sensors. 	 The resulting project results Active in discussions 	Criteria: 1.The resulting project results 2.Ability to present projects Form of Assessment : Project Results Assessment / Product Assessment	Project based learning 2 X 50		Material: IoT (monitoring and control) using the LM-35 sensor (temperature sensor) References: <i>Qusay F.</i> Hassan, <i>Atta ur</i> <i>Rehman</i> <i>Khan, Sajjad</i> <i>A. Madani.</i> 2018. Internet of Things: <i>Challenges,</i> <i>Advances,</i> <i>and</i> <i>Applications.</i> <i>CRC Press.</i>	5%

3	 Able to apply loT (monitoring and control) using the LM-35 sensor (temperature sensor) to solve problems in the engineering field Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of sensors. 	 The resulting project results Active in discussions 	Criteria: 1.The resulting project results 2.Ability to present projects Form of Assessment : Project Results Assessment / Product Assessment	Project based learning 2 X 50	Material: IoT (monitoring and control) using the LM-35 sensor (temperature sensor) References: Material: IoT (monitoring and control) using the LM-35 sensor (temperature sensor) Reader: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3: Leverage the power of Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects. Packt Publishing.	5%
4	 Able to apply IoT (monitoring and control) using the MQ2 LPG Btane sensor to solve problems in the engineering field Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of sensors. 	 The resulting project results Active in discussions 	Criteria: 1. The resulting project results 2. Active in discussions Form of Assessment : Project Results Assessment / Product Assessment	Project based learning 2 X 50	Material: Application of IoT (monitoring and control) using the MQ2 LPG Btane sensor. Reference: <i>Qusay F.</i> Hassan, Atta ur Rehman Khan, Sajjad A. Madani. 2018. Internet of Things: Challenges, Advances, and Applications. CRC Press.	5%
5	 Able to apply IoT (monitoring and control) using the MQ2 LPG Btane sensor to solve problems in the engineering field Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of sensors. 	 The resulting project results Active in discussions 	Criteria: 1. The resulting project results 2. Active in discussions Form of Assessment : Project Results Assessment / Product Assessment	Project based learning 2 X 50	Material: Application of IoT (monitoring and control) using the HC-SR04 system sensor . Library: Material: IoT (monitoring and control) using the MQ2 LPG Btane sensor and HC-SR04 Library: <i>Relevant</i> <i>research</i> <i>journals</i>	5%

6	 Able to apply loT (monitoring and control) using the HC- SR04 system sensor (ultrasonic sensor) to solve problems in the engineering field. Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an loT system using a combination of sensors. 	 Students' ability to apply IoT (monitoring and control) using the HC-SR04 system sensor (ultrasonic sensor) to solve problems in the engineering field. Active in discussions 	Criteria: 1.The resulting project results 2.Active in discussions Form of Assessment : Project Results Assessment / Product Assessment	Project based learning 2 X 50	Material: IoT (monitoring and control) using the HC-SR04 system sensor Library: Material: IoT (monitoring and control) using the HC-SR04 system sensor Reader: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects. Packt Publishing.	5%
7	 Able to apply loT (monitoring and control) using the HC- SR04 system sensor (ultrasonic sensor) to solve problems in the engineering field. Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an loT system using a combination of sensors. 	 Students' ability to apply IoT (monitoring and control) using the HC-SR04 system sensor (ultrasonic sensor) to solve problems in the engineering field. Active in discussions 	Criteria: 1. The resulting project results 2. Active in discussions Form of Assessment : Project Results Assessment / Product Assessment	Project based learning 2 X 50	Material: IoT (monitoring and control) using the HC-SR04 system sensor Library: Relevant research journals	5%
8	Midterm exam	 Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of sensors. Able to apply IoT (monitoring and control) using the LM-35 sensor (temperature sensor), MQ2 LPG Btane, and ultrasonics to solve problems in the engineering field. 	Criteria: 1.The resulting project results 2.Active in discussions Form of Assessment : Project Results Assessment / Product Assessment	2 X 50	Material: UTS in project form Library: Relevant research journals	30%

9	1 451 1	1 0 1	Critoria	Droject	Material	E0/
э	1.Able to apply IoT (monitoring	1.Students are able to apply	Criteria: 1.The resulting	Project based	Material: Application	5%
	and controlling)	loT (monitoring	project results	learning	of IoT in	
	using the	and controlling)	2.Active in	_	monitoring	
	DHT11	using the	discussions		and control	
	Temperature	DHT11			processes References:	
	Humidity	Temperature			Qusay F.	
	system sensor	Humidity and			Hassan,	
	to solve	PIR Motion			Atta ur	
	problems in the	system sensors to solve			Rehman	
	engineering field.	problems in the			Khan, Sajjad A. Madani.	
	2.Able to apply	engineering			A. Madani. 2018.	
	IoT (monitoring	field.			Internet of	
	and control)	2.Able to apply			Things:	
	using PIR	engineering			Challenges,	
	Motion to solve	principles,			Advances,	
	problems in the	identify,			and Applications.	
	engineering field.	formulate and analyze			CRC Press.	
	3.Able to apply	data/information				
	engineering	to solve				
	principles,	problems using				
	identify,	an IoT system				
	formulate and	using a				
	analyze	combination of				
	data/information	sensors.				
	to solve					
	problems using an IoT system					
	using a					
	combination of					
	sensors.					
10	1 Able to apply	1 Students are	Criteria:	Project	Material:	5%
10	1.Able to apply	1.Students are able to apply	Criteria: 1.The resulting	Project based	Material: Application	5%
10	IoT (monitoring	able to apply	Criteria: 1.The resulting project results			5%
10			1.The resulting	based	Application of IoT in monitoring	5%
10	IoT (monitoring and controlling)	able to apply IoT (monitoring	1.The resulting project results	based	Application of IoT in monitoring and control	5%
10	loT (monitoring and controlling) using the DHT11 Temperature	able to apply IoT (monitoring and controlling) using the DHT11	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity	able to apply IoT (monitoring and controlling) using the DHT11 Temperature	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: <i>Maneesh</i> <i>Rao. 2018.</i>	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve	able to apply IoT (monitoring) and controlling) using the DHT11 Temperature Humidity and PIR Motion	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: <i>Maneesh</i> <i>Rao. 2018.</i> <i>Internet of</i>	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the	able to apply loT (monitoring) and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: <i>Maneesh</i> <i>Rao.</i> 2018. <i>Internet of</i> <i>Things with</i>	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve	able to apply IoT (monitoring) and controlling) using the DHT11 Temperature Humidity and PIR Motion	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: <i>Maneesh</i> <i>Rao. 2018.</i> <i>Internet of</i>	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering field. 2.Able to apply loT (monitoring	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve problems in the engineering field.	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage the power of	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering field. 2.Able to apply loT (monitoring and control)	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve problems in the engineering field. 2.Able to apply	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: <i>Maneesh</i> <i>Rao. 2018.</i> <i>Internet of</i> <i>Things with</i> <i>Raspberry</i> <i>Pi 3:</i> <i>Leverage</i> <i>the power of</i> <i>Raspberry</i>	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering field. 2.Able to apply loT (monitoring and control) using PIR	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve problems in the engineering field. 2.Able to apply engineering	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: <i>Maneesh</i> <i>Rao. 2018.</i> <i>Internet of</i> <i>Things with</i> <i>Raspberry</i> <i>Pi 3:</i> <i>Leverage</i> <i>the power of</i> <i>Raspberry</i> <i>Pi 3 and</i>	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering field. 2.Able to apply loT (monitoring and control) using PIR Motion to solve	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve problems in the engineering field. 2.Able to apply engineering principles,	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: <i>Maneesh</i> <i>Rao. 2018.</i> <i>Internet of</i> <i>Things with</i> <i>Raspberry</i> <i>Pi 3:</i> <i>Leverage</i> <i>the power of</i> <i>Raspberry</i>	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering field. 2.Able to apply IoT (monitoring and control) using PIR Motion to solve problems in the	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve problems in the engineering field. 2.Able to apply engineering principles, identify,	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering field. 2.Able to apply loT (monitoring and control) using PIR Motion to solve	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve problems in the engineering field. 2.Able to apply engineering principles, identify, formulate and	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects.	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering field. 2.Able to apply loT (monitoring and control) using PIR Motion to solve problems in the engineering	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve problems in the engineering field. 2.Able to apply engineering principles, identify,	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects. Packt	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering field. 2.Able to apply IoT (monitoring and control) using PIR Motion to solve problems in the engineering field.	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve problems in the engineering field. 2.Able to apply engineering principles, identify, formulate and analyze data/information to solve	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects.	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering field. 2.Able to apply loT (monitoring and control) using PIR Motion to solve problems in the engineering field. 3.Able to apply engineering principles,	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve problems in the engineering field. 2.Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects. Packt	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering field. 2.Able to apply loT (monitoring and control) using PIR Motion to solve problems in the engineering field. 3.Able to apply engineering principles, identify,	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve problems in the engineering field. 2.Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects. Packt	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering field. 2.Able to apply loT (monitoring and control) using PIR Motion to solve problems in the engineering field. 3.Able to apply engineering principles, identify, formulate and	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve problems in the engineering field. 2.Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects. Packt	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering field. 2.Able to apply loT (monitoring and control) using PIR Motion to solve problems in the engineering field. 3.Able to apply engineering principles, identify, formulate and analyze	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve problems in the engineering field. 2.Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects. Packt	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering field. 2.Able to apply loT (monitoring and control) using PIR Motion to solve problems in the engineering field. 3.Able to apply engineering principles, identify, formulate and analyze data/information	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve problems in the engineering field. 2.Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects. Packt	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering field. 2.Able to apply loT (monitoring and control) using PIR Motion to solve problems in the engineering field. 3.Able to apply engineering principles, identify, formulate and analyze data/information to solve	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve problems in the engineering field. 2.Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects. Packt	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering field. 2.Able to apply IoT (monitoring and control) using PIR Motion to solve problems in the engineering field. 3.Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve problems in the engineering field. 2.Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects. Packt	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering field. 2.Able to apply loT (monitoring and control) using PIR Motion to solve problems in the engineering field. 3.Able to apply engineering principles, identify, formulate and analyze data/information to solve	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve problems in the engineering field. 2.Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects. Packt	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering field. 2.Able to apply loT (monitoring and control) using PIR Motion to solve problems in the engineering field. 3.Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve problems in the engineering field. 2.Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects. Packt	5%
10	loT (monitoring and controlling) using the DHT11 Temperature Humidity system sensor to solve problems in the engineering field. 2.Able to apply loT (monitoring and control) using PIR Motion to solve problems in the engineering field. 3.Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a	able to apply IoT (monitoring and controlling) using the DHT11 Temperature Humidity and PIR Motion system sensors to solve problems in the engineering field. 2.Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of	1.The resulting project results 2.Active in	based	Application of IoT in monitoring and control processes Reference: Maneesh Rao. 2018. Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects. Packt	5%

11	 Able to apply loT (monitoring and controlling) using raindrop humidity to solve problems in the engineering field. Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an loT system using a combination of sensors. 	 Students are able to apply loT (monitoring and controlling) using raindrop humidity to solve problems in the engineering field. Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an loT system using a combination of sensors. 	Criteria: 1.The resulting project results 2.Active in discussions Form of Assessment : Project Results Assessment / Product Assessment	Project based learning	Material: Application of IoT in monitoring and control processes References: <i>Qusay F.</i> <i>Hassan,</i> <i>Atta ur</i> <i>Rehman</i> <i>Khan, Sajjad</i> <i>A. Madani.</i> <i>2018.</i> <i>Internet of</i> <i>Things:</i> <i>Challenges,</i> <i>Advances,</i> <i>and</i> <i>Applications.</i> <i>CRC Press.</i>	5%
12	 Able to apply IoT (monitoring and controlling) using raindrop humidity to solve problems in the engineering field. Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of sensors. 	 Students are able to apply IoT (monitoring) using raindrop humidity to solve problems in the engineering field. Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of sensors. 	Criteria: 1.The resulting project results 2.Active in discussions Form of Assessment : Project Results Assessment / Product Assessment	Project based learning	Material: Application of IoT in monitoring and control processes References: Qusay F. Hassan, Atta ur Rehman Khan, Sajjad A. Madani. 2018. Internet of Things: Challenges, Advances, and Applications. CRC Press.	5%
13	 Able to apply loT (monitoring and control) using the Flame sensor module KY-026 to solve problems in the engineering field. Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of sensors. 	 Students are able to apply IoT (monitoring and control) using the Flame sensor module KY-026 to solve problems in the engineering field. Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of sensors. 	Criteria: 1.Resulting project 2.Active in discussions Form of Assessment : Project Results Assessment / Product Assessment	Project based learning	Material: Application of IoT (monitoring and control) using the Flame sensor module KY- 026 to solve problems in the engineering field. References: Material: Application of IoT in monitoring and control processes References: <i>Qusay F.</i> Hassan, Atta ur Rehman Khan, Sajjad A. Madani. 2018. Internet of Things: Challenges, Advances, and Applications. <i>CRC Press.</i>	5%

· · · · ·				1	 	
14	 Able to apply loT (monitoring and control) using the Flame sensor module KY-026 to solve problems in the engineering field. Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of sensors. 	 Students are able to apply IoT (monitoring and control) using the Flame sensor module KY-026 to solve problems in the engineering field. Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of sensors. 	Criteria: 1.Resulting project 2.Active in discussions Form of Assessment : Project Results Assessment / Product Assessment	Project based learning	Material: Application of IoT (monitoring and control) using the Flame sensor module KY- 026 to solve problems in the engineering field. References: Material: Application of IoT in monitoring and control processes References: <i>Qusay F.</i> Hassan, Atta ur Rehman Khan, Sajjad A. Madani. 2018. Internet of Things: Challenges, Advances, and Applications. <i>CRC Press.</i>	5%
15	 Able to apply loT using a combination of sensors to solve problems in the engineering field (both monitoring and controlling systems). Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of sensors. 	Able to apply IoT using a combination of sensors to solve problems in the engineering field (both monitoring and controlling systems). Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of sensors.	Criteria: 1.Resulting project 2.Active in discussions.	Project based learning	Material: Application of IoT using a combination of sensors to solve problems in the engineering field (both monitoring and controlling systems). References: Material: Application of IoT in monitoring and control processes References: Robbins, Michael F. 2019. Ultimate Electronics: Practical Circuit Design and Analysis. CircuitLab Inc.	15%

16	 Able to apply loT using a combination of sensors to solve problems in the engineering field (both monitoring and controlling systems). Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of sensors. 	Able to apply IoT using a combination of sensors to solve problems in the engineering field (both monitoring and controlling systems). Able to apply engineering principles, identify, formulate and analyze data/information to solve problems using an IoT system using a combination of sensors.	Criteria: 1.Resulting project 2.Active in discussions. Form of Assessment : Project Results Assessment / Product Assessment	Project based learning		Material: Application of IoT using a combination of sensors to solve problems in the engineering field (both monitoring and controlling systems). References:	15%
----	--	---	---	------------------------------	--	--	-----

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	5%
2.	Project Results Assessment / Product Assessment	95%
		100%

Notes

- 1. 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.
- 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.
- 3. **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** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities or performance of student learning outcomes accompanied by evidence.
- 6. 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 sub-topics.
- 11. 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%.
- 12. TM=Face to face, PT=Structured assignments, BM=Independent study.