

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

Document Code

SEMESTER LEARNING PLAN

			CODE			C	ourse I	amily=		Cre	dit We	eight		SEME	STER	C	ompila ate	ation
BASIC INOR	GANIC THEORY		472010219	1		С	ompuls	ory Stu	dy	T=3	P=0	EC	TS=4.77		3	Jı	uly 17,	2022
AUTHORIZA	ΓΙΟΝ		SP Develo	per		LPi	rogram	Subjec	ts Cours	se Clu	ster C	coord	inator	Study	Program	n Coo	ordina	tor
			Prof. Dr. Sa Amaria, M. M.Sc., Ama Wijayanto,	ari Ed Si., D Ilia Pu M.Sc.	i Cahyan ina Kartil utri Purna ., D.Sc.	ingrum ka Mah amasar	ı, M.Si., arani, S i, M.Si.	Dr. S.Si., , Herry	Prof. I	Dr. Acl	nmad	Lutfi,	M.Pd.	Dr. Amaria, M.Si.				
Learning model	Case Studies																	
Program	PLO study pro	ogram	that is cha	rged	to the o	course	9											
Learning Outcomes	Program Obje	ctives	6 (PO)															
(PLO)	PO - 1	Utilize	learning reso	ource	s and IC	T to su	pport m	astery	of Inorg	janic C	hemi	stry co	oncepts	and the	ories			
	PO - 2	Have thermo	knowledge odynamics ar	about nd rec	t the pe lox react	riodic ions, m	propert	ties of ar struct	elemer ture: co	nts, a valent	cid-ba bonds	se th s, ioni	eory, th c bonds	e basio and soli	cs of cho id system	emica ıs.	l reac	tions,
	PO - 3	Make chemio	decisions in cal reactions,	linkir therr	ng the c modynan	oncept nics an	s of co d redox	nserva reactio	tion of ons, cov	eleme valent	ental p bonds	propei , ionio	rties with bonds a	n acid-b and soli	ase theo d system	ory, th s	e bas	ics of
	PO - 4	Have a	an honest an	d res	ponsible	attitude	e in stu	dying in	organic	chem	istry o	once	pts					
	PLO-PO Matri	x																
	PO Matrix at t	P.0 PO-1 PO-2 PO-3 PO-4																
			P.O		, ,					W	eek					•		
				1	2 3	3 4	5	6	7	8 9	9 1	0	11 1	2 13	3 14	15	16	i
		PO	-1															
		PO	-2															
		PO	-3															
		PO	-4															
Short Course Description	Study of the per reactions, therm	eriodicit Iodynai	ty of elemer mics and red	tal pi ox rea	roperties actions, a	, coval and sol	ent bo id syste	nds, io ems in g	nic bon group c	ds, ch ollaboi	emica ation	al forc forum	ces, acid is with di	-base t scussio	heory, ba n activitie	asics es	of che	mical
References	Main :																	
	 Huheey Harper(Madan, Manku, (2004). Compare Sugiarte Sari Ed 	 Huheey, J. E.; Keiter, E. A.; Keiter, R. L., 1990, Inorganic Chemistry, Principles of Structure and Reactivity, Fourth Edition, HarperCollins College Publishers. Madan, R. D., 1997. Modern Inorganic Chemistry, S. Chand and Company LTD, NewDelhi. Manku, G. S., 1980, Theoritical Principles of Inorganik Chemistry, Tata Mc GrawHill Book Co of India. Arends, Richard I. (2004).Guide to FieldExperiences and Portofolio Development: to accompany ;learning to teach.New York: McGraw-Hill Book Company. Sugiarto, Bambang. 2012. Sistem Periodik Unsur. Surabaya: Penerbit Unesa Sari Edi Cahyaningrum, 2018, Teori Dasar Kimia Anorganik, Unesa University Press 																

	Supporters:							
	1. Jurnal	jurnal te	erkini terkait das	ar reaksi kimia Anorgani	k			
Support lecturer	Dr. Amaria, M. Prof. Dr. Sari E Dr. Dina Kartik Amalia Putri Pu Herry Wijayant	Si. di Cahy a Mahar urnamas o, S.Pd.	raningrum, M.Si. rani, S.Si., M.Sc sari, S.Si., M.Si. , M.Sc., D.Sc.					
Week-	Final abilities of each learning stage	lities of Eval		uation	Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials	Assessment Weight (%)
	(Sub-PO)	I	ndicator	Criteria & Form	Offline(offline)	Online (<i>online</i>)	[References]	
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
1	Can explain the basic theories of the periodic properties of elements	1.1 m el 2.2 pr io el a 3.3 pr el a a th	. Explain the heaning of ffective core ontent . Explain the eriodicity of nization nergy and the actors that iffuence it . Explain the eriodicity of lectron affinity nd the factors hat influence it	Criteria: 1.1. Participation during lectures is carried out through observation with a weight of 20% 2.2. Midterm Examination (UTS) is carried out to access indicators from TM 1-7, through a written test and is given a weight of 20% 3.3. Structured assignment assessments are averaged, then given a weight of 30% 4.4. The Final Semester Examination (UAS) is used to measure indicators from TM 9-15, through a written test and the results are given a weight of 30% 5.5. Final Grade (NA) is 20% participation grade, 20% UTS grade, 30% assignment grade, and 30% UAS grade Form of Assessment : Participatory Activities	Discussions about the phenomena of elements in SPU are arranged in such a way (in terms of grouping based on group and periodic 3		Matter: Periodicity of elemental properties: Effective nuclear charge, Shielding effect, Ionization energy, Electron affinity, Electronegativity, Covalent and ionic radii; Chemical Bonds Bibliography: Huheey, JE ; Keiter, R.L. ; Keiter, R.L. ; Nerospice of Structure and Reactivity, Fourth Edition, HarperCollins College Publishers.	5%

2	Analyze the basic theories of the periodic properties of elements	 1.1. Explain the meaning of effective core content 2.2. Explain the periodicity of ionization energy and the factors that influence it 3.3. Explain the periodicity of electron affinity and the factors that influence it 4.4. Explain the periodicity of electronegativity and the factors that influence it that influence it 	 1.1. Participation during lectures is carried out through observation with a weight of 20% 2.2. Midterm Examination (UTS) is carried out to access indicators from TM 1-7, through a written test and is given a weight of 20% 3.3. Structured assignment assessments are averaged, then given a weight of 30% 4.4. The Final Semester Examination (UAS) is used to measure indicators from TM 9-15, through a written test and the results are given a weight of 30% 5.5. Final Grade (NA) is 20% participation grade, 20% UTS grade, 30% assignment grade, and 30% UAS grade 	Presentation, Discussion and reflection. 3 X 50		Matter: Periodicity of elemental properties: Effective nuclear charge, Shielding effect, Ionization energy, Electron affinity, Electronegativity, Covalent and ionic radii; Chemical Bonds Bibliography: Huheey, JE ; Keiter, EA ; Keiter, R.L., 1990, Inorganic Chemistry, Frinciples of Structure and Reactivity, Fourth Edition, HarperCollins College Publishers.	5%
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3	Analyze the basic theories of the periodic properties of elements	 1.1. Explain the meaning of effective core content 2.2. Explain the periodicity of ionization energy and the factors that influence it 3.3. Explain the periodicity of electron affinity and the factors that influence it 4.4. Explain the periodicity of electronegativity and the factors that influence it that influence it 	 Criteria: 1.1. Participation during lectures is carried out through observation with a weight of 20% 2.2. Midterm Examination (UTS) is carried out to access indicators from TM 1-7, through a written test and is given a weight of 20% 3.3. Structured assignment assessments are averaged, then given a weight of 30% 4.4. The Final Semester Examination (UAS) is used to measure indicators from TM 9-15, through a written test and the results are given a weight of 30% 5.5. Final Grade (NA) is 20% participation grade, 20% UTS grade, 30% assignment grade, and 30% UAS grade 	Presentation, Discussion and reflection. 3 X 50		Matter: Periodicity of elemental properties: Effective nuclear charge, Shielding effect, lonization energy, Electron affinity, Electronegativity, Covalent and ionic radii; Chemical Bonds Bibliography: <i>Huheey, JE</i> ; <i>Keiter, EA</i> ; <i>Keiter, R.L.</i> , 1990, Inorganic Chemistry, <i>Principles of</i> <i>Structure and</i> <i>Reactivity,</i> <i>Fourth Edition,</i> <i>HarperCollins</i> <i>College</i> <i>Publishers.</i>	5%
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	different types of chemical bonds and the formation of covalent, coordination, ionic compounds.	 1.1. Explain the properties of ionic compounds 2.2. Explain the formation of ionic compounds 3.3. Explain the relationship between enthalpy changes and the solubility of ionic compounds 4.4. Use Fajan's rule to explain the nature of bonds 5.5. Explain the formation of covalent bonds 6.6. Determine the structure/shape of the molecule 7.7. Determine the ionic character of covalently bonded molecules 	 1.1. Participation during lectures is carried out through observation with a weight of 20% 2.2. Midterm Examination (UTS) is carried out to access indicators from TM 1-7, through a written test and is given a weight of 20% 3.3. Structured assignment assessments are averaged, then given a weight of 30% 4.4. The Final Semester Examination (UAS) is used to measure indicators from TM 9-15, through a written test and the results are given a weight of 30% 5.5. Final Grade (NA) is 20% participation grade, 20% UTS grade, 30% assignment grade, and 30% UAS grade 	Discussion and reflection 3 X 50		Chemical Bonding: Introduction, Ionic Bonding: Properties of ionic compounds, formation of ionic compounds, formation of ionic compounds, ratio radius, lattice energy, solubility of ionic compounds, Fajan's rule, deviations of simple ionic structures References: <i>Madan, RD,</i> 1997. <i>Modern</i> <i>Inorganic</i> <i>Chemistry, S.</i> <i>Chand and</i> <i>Company LTD,</i> <i>New Delhi.</i> Material: Covalent bonds: Valence bond theory, valence shell electron repulsion theory, molecular orbital theory, dipole moment. Chemical forces: hydrogen bonds, van der Waals References: <i>Madan, RD,</i> 1997. <i>Modern</i> <i>Inorganic</i> <i>Chemistry, S.</i> <i>Chand and</i> <i>Company LTD,</i> <i>New Delhi.</i>	57
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	different types of chemical bonds and the formation of covalent, coordination, ionic compounds.	 properties of ionic compounds 2.2. Explain the formation of ionic compounds 3.3. Explain the relationship between enthalpy changes and the solubility of ionic compounds 4.4. Use Fajan's rule to explain the nature of bonds 5.5. Explain the formation of covalent bonds 6.6. Determine the structure/shape of the molecule 7.7. Determine the ionic character of covalently bonded molecules 	 1.1. Participation during lectures is carried out through observation with a weight of 20% 2.2. Midterm Examination (UTS) is carried out to access indicators from TM 1-7, through a written test and is given a weight of 20% 3.3. Structured assignment assessments are averaged, then given a weight of 30% 4.4. The Final Semester Examination (UAS) is used to measure indicators from TM 9-15, through a written test and the results are given a weight of 30% 5.5. Final Grade (NA) is 20% participation grade, 20% UTS grade, 30% assignment grade, and 30% UAS grade 	and questions and answers 3 X 50		Chemical Bonding: Introduction, Ionic Bonding: Properties of ionic compounds, formation of ionic compounds, ratio radius, lattice energy, solubility of ionic compounds, Fajan's rule, deviations of simple ionic structures References: Madan, RD, 1997. Modern Inorganic Chemistry, S . Chand and Company LTD, New Delhi. Material: Covalent bonds: Valence bond theory, valence shell electron repulsion theory, molecular orbital theory, dipole moment. Chemical forces: hydrogen bonds, van der Waals References: Madan, RD, 1997. Modern Inorganic Chemistry, S. Chand and Company LTD, NewDelhi.	
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6	different types of	1.1. Explain the	Criteria:	aiscussion		Material:	3%
	chemical bonds	properties of	1.1. Participation	anu	1	Donding	
	and the	ionic	during lectures is	questions		Bonuing.	
	formation of	compounds	carried out			Introduction,	
	covalent,	2.2. Explain the	through	3 X 50		Ionic Bonaing:	
	coordination,	formation of	observation with			Properties of	
	ionic compounds.	ionic	a weight of 20%			IONIC	
		compounds	2.2. Midterm			compounds,	
		3.3 Explain the	Examination			tormation of ionic	
		relationship	(UTS) is carried			compounds,	
		between				ratio radius,	
		onthalpy	indicators from			lattice energy,	
		entilalpy	TM 1-7 through			solubility of lonic	
		changes and the	a written test and			Compounds,	
			a willen lest and			rajan's rule,	
		compounds	of 2004			cimple ionie	
		4.4. Use Fajan's	2 2 Ctrueture d			structures	
		rule to explain	3.3. Structured			Deferences:	
		the nature of	assignment			Madan PD	
		bonds	assessments are			1007 Modorn	
		5.5. Explain the	averaged, then			Inorganic	
		formation of	given a weight of			Chemistry S	
		covalent bonds	30%			Chand and	
		6.6. Determine	4.4. The Final			Company I TD	
		the	Semester			New Delhi	
		structure/shape	Examination			New Denn.	
		of the molecule	(UAS) is used to			Motorial	
		7.7. Determine	measure			Malerial:	
		the ionic	indicators from			Valanco bond	
		character of	TM 9-15, through			theory volonee	
		covalently	a written test and			shall alactron	
		bonded	the results are			repulsion theory	
		molecules	given a weight of			molecular orbital	
		molecules	30%			theory dinole	
			5.5 Einal Grade			moment	
			(NA) is 20%			Chemical forces	
			(INA) IS 2070			hydrogen honds	
			participation			van der Waals	
			grade, 20% UTS			References:	
			grade, 30%			Madan RD	
			assignment			1997. Modern	
			grade, and 30%			Inorganic	
			UAS grade			Chemistry S	
						Chand and	
			Form of Assessment			Company LTD.	
			: Participatory Activities			NewDelhi.	

7	Analyze the different types of chemical bonds and the formation of covalent, coordination, ionic compounds.	 1.1. Explain the properties of ionic compounds 2.2. Explain the formation of ionic compounds 3.3. Explain the relationship between enthalpy changes and the solubility of ionic compounds 4.4. Use Fajan's rule to explain the nature of bonds 5.5. Explain the formation of covalent bonds 6.6. Determine the structure/shape of the molecule 7.7. Determine the ionic character of covalently bonded molecules 	Criteria: 1.1. Participation during lectures is carried out through observation with a weight of 20% 2.2. Midterm Examination (UTS) is carried out to access indicators from TM 1-7, through a written test and is given a weight of 20% 3.3. Structured assignment assessments are averaged, then given a weight of 30% 4.4. The Final Semester Examination (UAS) is used to measure indicators from TM 9-15, through a written test and the results are given a weight of 30% 5.5. Final Grade (NA) is 20% participation grade, 30% assignment grade, and 30% UAS grade Form of Assessment : Participatory Activities	discussion and questions and answers 3 X 50	Material: Chemical Bonding: Introduction, Ionic Bonding: Properties of ionic compounds, formation of ionic compounds, ratio radius, lattice energy, solubility of ionic compounds, Fajan's rule, deviations of simple ionic structures References: Madan, RD, 1997. Modern Inorganic Chemistry, S. Chand and Company LTD, New Delhi. Material: Covalent bonds: Valence bond theory, valence shell electron repulsion theory, molecular orbital theory, dipole moment. Chemical forces: hydrogen bonds, van der Waals References: Madan, RD, 1997. Modern Inorganic Chemistry, S. Chand and Company LTD, NewDelhi.	3%
8	Do UTS questions with the correct answers	answer the UTS questions correctly	Criteria: The Mid-Semester Examination (UTS) is carried out to access indicators from TM 1-7, through a written test and is given a weight of 20% Form of Assessment : Test	Written test 3 X 50		20%

9	Analyze the principles of chemical reactions, acid- base theory, acid strength, dissolution processes, reactions in water and non- water solvents	 1.1. Explain the occurrence of chemical reactions based on thermodynamic and kinetic aspects 2.2. Explain the differences in acid-base theory: Arrhenius, Bronsted Lowry, Lux-Flood, Usanofich, Lewis, soft hard acids and bases 3.3. Explain the process of dissolving compounds, both ionic and covalent 4.4. Explain the effect of temperature on solubility 5.5. Explain the mechanism of dissolving compounds in water 6.6. Explain the types of reactions based on the solvent 	 Criteria: Participation during lectures is carried out through observation with a weight of 20% Andrew Comparison of the second out of 20% Andrew Comparison of the second out to access indicators from TM 1-7, through a written test and is given a weight of 20% Structured assignment assessments are averaged, then given a weight of 30% And The Final Semester Examination (UAS) is used to measure indicators from TM 9-15, through a written test and the results are given a weight of 30% Structured assignment assessments are averaged, then given a weight of 30% And The Final Semester Examination (UAS) is used to measure indicators from TM 9-15, through a written test and the results are given a weight of 30% Stop Comparison of the second of the	discussion and questions and answers 3 X 50		3%
			Participatory Activities			

10	Analyze the principles of chemical reactions, acid- base theory, acid strength, dissolution processes, reactions in water and non- water solvents	 1.1. Explain the occurrence of chemical reactions based on thermodynamic and kinetic aspects 2.2. Explain the differences in acid-base theory: Arrhenius, Bronsted Lowry, Lux-Flood, Usanofich, Lewis, soft hard acids and bases 3.3. Explain the process of dissolving compounds, both ionic and covalent 4.4. Explain the effect of temperature on solubility 5.5. Explain the mechanism of dissolving compounds in water 6.6. Explain the types of reactions based on the solvent 	 Criteria: Participation during lectures is carried out through observation with a weight of 20% A. Midterm Examination (UTS) is carried out to access indicators from TM 1-7, through a written test and is given a weight of 20% S. Structured assignment assessments are averaged, then given a weight of 30% A. The Final Semester Examination (UAS) is used to measure indicators from TM 9-15, through a written test and the results are given a weight of 30% S. Final Grade (NA) is 20% participation grade, 20% UTS grade, 30% assignment grade, and 30% UAS grade 	discussion and questions and answers 3 X 50	Material: Chemical reactions: Basic principles of chemical reactions, acid- base theories, acid strength, dissolution processes, reactions in water and non- water solvents Reference: Sari Edi Cahyaningrum, 2018, Basic Theory of Inorganic Chemistry, Unesa University Press	3%
11	Analyze the principles of chemical reactions, acid- base theory, acid strength, dissolution processes, reactions in water and non- water solvents	 1.1. Explain the occurrence of chemical reactions based on thermodynamic and kinetic aspects 2.2. Explain the differences in acid-base theory: Arrhenius, Bronsted Lowry, Lux-Flood, Usanofich, Lewis, soft hard acids and bases 3.3. Explain the process of dissolving compounds, both ionic and covalent 4.4. Explain the effect of temperature on solubility 5.5. Explain the mechanism of dissolving compounds in water 6.6. Explain the types of reactions based on the solvent 	 Participatory Activities Criteria: Participation during lectures is carried out through observation with a weight of 20% Midterm Examination (UTS) is carried out to access indicators from TM 1-7, through a written test and is given a weight of 20% Structured assignment assessments are averaged, then given a weight of 30% A. The Final Semester Examination (UAS) is used to measure indicators from TM 9-15, through a written test and the results are given a weight of 30% 	discussion and questions and answers 3 X 50	Material: Chemical reactions: Basic principles of chemical reactions, acid- base theories, acid strength, dissolution processes, reactions in water and non- water solvents Reference: Sari Edi Cahyaningrum, 2018, Basic Theory of Inorganic Chemistry, Unesa University Press	3%

12	Analyzing	1 1 Eveloin	Criteria	summerizing	Material	30%
	oxidation-	1.1. Explain	1 1 Dartinination	discussion	Oxidation and	370
	reduction	several	L.I. Participation	and	Reduction	
	reactions of	concepts of	during lectures is	questions	Reactions:	
	inorganic	oxidation-	carried out	and answers	Definition of	
	compounds and	reduction	through	3 X 50	oxidation-	
	magnitude of the	reactions	observation with	0 / 00	reduction	
	reaction from	2.2. Predict the	a weight of		reactions half	
	electrode	occurrence of a	20%1.		reactions.	
	potential values	chemical	Participation		oxidation levels	
		reaction based	during lectures is		and oxidation	
		on the value of	carried out		numbers, driving	
		the change in	through		force of chemical	
		free energy from	observation with		reactions,	
		the electrode	a weight of 20%		oxidation	
		potential or	2.2. Midterm		potential,	
		oxidation	Examination		galvanic cells,	
		potential	(UTS) is carried		potential	
		3.3. Distinguish	out to access		Reference: Sari	
		between cell	indicators from		Edi	
		potential and	TM 1-7, through		Cahyaningrum,	
		electrode	a written test and		2018, Basic	
		potential. The	is given a weight		Theory of	
		standard	of 20%		Chomistry	
		electrode	3.3. Structured		Unosa University	
		potential values	assignment		Dress University	
		are given	assessments are		1 1033	
		4.4. Calculate the	averaged, then		Motorial	
		equilibrium	given a weight of		Ovidation and	
		constant of a	30%		Peduction	
		reaction	4.4. The Final		Reactions:	
		5.5. Explain	Semester		Definition of	
		changes in pH	Examination		oxidation-	
		and Fo values	(UAS) is used to		reduction	
		6.6. Calculate Eo	measure		reactions. half	
		from the EME	indicators from		reactions,	
		diagram	TM 9-15 through		oxidation levels	
		alagram	a written test and		and oxidation	
			the results are		numbers, driving	
			given a weight of		force of chemical	
			30%		reactions,	
			5.5 Final Grade		oxidation-dation	
			(NA) is 20%		potential,	
			participation		galvanic cells,	
			grade 20% UTS		electrode	
			grade 30%		potential,	
			assignment		application of	
			arade and 20%		electrode	
			LIAS grade		notential	
			Ono grade		reactions in	
			Form of Assessment		water medium	
			:		Reference	
			Participatory Activities		: Sari Edi	
			, , , , , , , , , , , , , , , , , , , ,		Cahyaningrum.	
					2018, Basic	
					Theory of	
					Inorganic	
					Chemistry,	
					Unesa University	
					Press	

13	Analyzing oxidation- reduction reactions of inorganic compounds and predicting the magnitude of the reaction from electrode potential values	 1.1. Explain several concepts of oxidation- reduction reactions 2.2. Predict the occurrence of a chemical reaction based on the value of the change in free energy from the electrode potential or oxidation potential 3.3. Distinguish between cell potential and electrode potential. The standard electrode potential values are given 4.4. Calculate the equilibrium constant of a reaction 5.5. Explain changes in pH and Eo values 6.6. Calculate Eo from the EMF diagram 	 Criteria: 1.1. Participation during lectures is carried out through observation with a weight of 20%1. Participation during lectures is carried out through observation with a weight of 20% 2.2. Midterm Examination (UTS) is carried out to access indicators from TM 1-7, through a written test and is given a weight of 20% 3.3. Structured assignment assessments are averaged, then given a weight of 30% 4.4. The Final Semester Examination (UAS) is used to measure indicators from TM 9-15, through a written test and the results are given a weight of 30% 5.5. Final Grade (NA) is 20% participation grade, 20% UTS grade, 30% assignment grade, and 30% UAS grade 	summarizing, discussion and questions and answers 3 X 50		Material: Oxidation and Reduction Reactions: Definition of oxidation- reduction reactions, half reactions, half reactions, driving force of chemical reactions, driving force of chemical reactions, oxidation-dation potential, galvanic cells, electrode potential, application of standard electrode potential, reactions in water medium. Reference : Sari Edi Cahyaningrum, 2018, Basic Theory of Inorganic Chemistry, Unesa University Press	3%
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	system phenomena including ionic and covalent solids and their conductivity properties	 1.1. Name the various crystal systems 2.2. Determine the Miler and Weiss index of a crystal plane 3.3. Determine the number of particles and particle volume in a crystal 4.4. Explain the use of Schottky and Frenkel defects as semiconductor materials 5. Explain the differences in the properties of conductors, insulators and semiconductors with band theory 	 1.1. Participation during lectures is carried out through observation with a weight of 20%1. Participation during lectures is carried out through observation with a weight of 20% 2.2. Midterm Examination (UTS) is carried out to access indicators from TM 1-7, through a written test and is given a weight of 20% 3.3. Structured assignment assessments are averaged, then given a weight of 30% 4.4. The Final Semester Examination (UAS) is used to measure indicators from TM 9-15, through a written test and the results are given a weight of 30% 5.5. Final Grade (NA) is 20% participation grade, 20% UTS grade, 30% assignment grade, and 30% UAS grade 	concept maps about solid systems, draw crystal planes, calculate Miller and Weiss indices Discuss and draw various types of ionic solids 3 X 50		Structure: Crystal and amorphous, Ionic solids, Garphite and diamond, defect structure, and band theory References: Sari Edi Cahyaningrum, 2018, Basic Theory of Inorganic Chemistry, Unesa University Press	
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15	Analyze solid system phenomena including ionic and covalent solids and their conductivity properties	 1.1. Name the various crystal systems 2.2. Determine the Miler and Weiss index of a crystal plane 3.3. Determine the number of particles and particle volume in a crystal 4.4. Explain the use of Schottky and Frenkel defects as semiconductor materials 5. Explain the differences in the properties of conductors, insulators and semiconductors with band theory 	 Criteria: 1.1. Participation during lectures is carried out through observation with a weight of 20%1. Participation during lectures is carried out through observation with a weight of 20% 2.2. Midterm Examination (UTS) is carried out to access indicators from TM 1-7, through a written test and is given a weight of 20% 3.3. Structured assignment assessments are averaged, then given a weight of 30% 4.4. The Final Semester Examination (UAS) is used to measure indicators from TM 9-15, through a written test and the results are given a weight of 30% 5.5. Final Grade (NA) is 20% participation grade, 20% UTS grade, 30% assignment grade, and 30% UAS grade 	Create concept maps about solid systems, draw crystal planes, calculate Miller and Weiss indices Discuss and draw various types of ionic solids 3 X 50	Material: Solid Structure: Crystal and amorphous, Ionic solids, Garphite and diamond, defect structure, and band theory References: Sari Edi Cahyaningrum, 2018, Basic Theory of Inorganic Chemistry, Unesa University Press	3%
16	Do UAS questions correctly		Participatory Activities Criteria: 1.The Final Semester Examination (UAS) is used to measure indicators from TM 9-15, through a written test and the results are given a weight of 30% 2.Final Grade (NA) is 20% participation grade, 20% UTS grade, 30% assignment grade, and 30% UAS grade Form of Assessment : Test	3 X 50		30%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	50%
2.	Test	50%
		100%

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.
- 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.