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

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Inorganic Chemistry I	8420403108		T=3	P=0	ECTS=4.77	4	July 18, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Prof. Dr. Utiya Azizah, M.Pd.

Learning model	**Case Studies**
Program Learning Outcomes (PLO)	**PLO study program which is charged to the course**
	Program Objectives (PO)
	PLO-PO Matrix

	P.O

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Short Course Description	Study of the periodicity of elemental properties, covalent bonds, ionic bonds, chemical forces, acid-base theory, basics of chemical reactions, thermodynamics and redox reactions, and solid systems in group collaboration forums with discussion activities.
References	**Main :**

1. Huheey,J. E. ; Keiter, E. A. ; Keiter, R. L. , 1990,InorganicChemistry, Prinsciples of Structure and Reactivity, Fourth Edition, HarperCollins College Publishers.
2. Madan,R. D. , 1997.Modern Inorganic Chemistry, S. Chand and Company LTD, NewDelhi.
3. Manku,G. S. , 1980,Theoritical Principles ofInorganik 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.
4. Sugiarto,Bambang. 2012.Sistem Periodik Unsur. Surabaya: Penerbit Unesa

	Supporters:
Supporting lecturer	Prof. Dr. Sari Edi Cahyaningrum, M.Si. Dr. Dina Kartika Maharani, S.Si., M.Sc.

Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

1	Understand the basic theories of the periodic properties of elements	1. Explain the meaning of effective core content. 2. Explain the periodicity of ionization energy and the factors that influence it 3. Explain the periodicity of electron affinity and the factors that influence it 4. Explain the periodicity of electronegativity and the factors that influence it	**Criteria:** participation and tasks	Presentation, Discussion and reflection. 3 X 50			0%
2	Understand the basic theories of the periodic properties of elements	1. Explain the meaning of effective core content. 2. Explain the periodicity of ionization energy and the factors that influence it 3. Explain the periodicity of electron affinity and the factors that influence it 4. Explain the periodicity of electronegativity and the factors that influence it	**Criteria:** participation and tasks	Presentation, Discussion and reflection 3 X 50			0%
3	Understand the basic theories of the periodic properties of elements	1. Explain the meaning of effective core content. 2. Explain the periodicity of ionization energy and the factors that influence it 3. Explain the periodicity of electron affinity and the factors that influence it 4. Explain the periodicity of electronegativity and the factors that influence it	**Criteria:** participation and tasks	Presentation, Discussion and reflection 3 X 50			0%
4	Understand the different types of chemical bonds and the formation of covalent, coordination, ionic compounds.	1. Explain the properties of ionic compounds 2. Explain the formation of ionic compounds 3. Explain the relationship between enthalpy changes and solubility of ionic compounds 4. Use Fajan‘s rule to explain the nature of bonds 5. Explain the formation of covalent bonds 6. Determine the structure/shape of molecules 7. Determine the character ionic from covalently bonded molecules 8. Write down the molecular orbital theory	**Criteria:** participation and tasks	discussion and questions and answers 3 X 50			0%

5	Understand the different types of chemical bonds and the formation of covalent, coordination, ionic compounds	1. Explain the properties of ionic compounds 2. Explain the formation of ionic compounds 3. Explain the relationship between enthalpy changes and solubility of ionic compounds 4. Use Fajan's rule to explain the nature of bonds 5. Explain the formation of covalent bonds 6. Determine the structure/shape of molecules 7. Determine the character ionic of covalently bonded molecules Write down molecular orbital theory	**Criteria:** participation and tasks	Practice assignments, discussions and reflections 3 X 50			0%
6	Understand the different types of chemical bonds and the formation of covalent, coordination, ionic compounds	Explain the properties of ionic compounds 2. Explain the formation of ionic compounds 3. Explain the relationship between enthalpy changes and solubility of ionic compounds 4. Use Fajan's rule to explain the nature of bonds 5. Explain the formation of covalent bonds 6. Determine the structure/shape of molecules 7. Determine the ionic character of covalently bonded molecules 8. Write down the molecular orbital theory	**Criteria:** participation and tasks	discussion, question and answer and presentation 3 X 50			0%
7	Understand the different types of chemical bonds and the formation of covalent, coordination, ionic compounds	1. Explain the properties of ionic compounds 2. Explain the formation of ionic compounds 3. Explain the relationship between enthalpy changes and solubility of ionic compounds 4. Use Fajan's rule to explain the nature of bonds 5. Explain the formation of covalent bonds 6. Determine the structure/shape of molecules 7. Determine the character ionic of covalently bonded molecules Write down molecular orbital theory	**Criteria:** participation and tasks	discussion and questions and answers 3 X 50			0%
8	do UTS questions with the correct answers	Answer the UTS questions correctly	**Criteria:** UTS exam	written test 3 X 50			0%

9	Understand the principles of chemical reactions, acid-base theory, acid strength, dissolution processes, reactions in water and non-water solvents	1. Explain the occurrence of chemical reactions based on thermodynamic aspects and kinetic aspects 2. Explain the differences between acid and base theories: Arrhenius, Bronsted Lowry, Lux-Flood, Usanofich, Lewis, hard and soft acids and bases 3. Explain the process of dissolving compounds, both ionic and covalent 4. . Explain the effect of temperature on solubility 5. Explain the mechanism of dissolving compounds in water 6. Explain the types of reactions based on the solvent.	**Criteria:** assignments and participation	discussion and questions and answers 3 X 50			0%
10	Understand the principles of chemical reactions, acid-base theory, acid strength, dissolution processes, reactions in water and non-water solvents	Explain the occurrence of chemical reactions based on thermodynamic aspects and kinetic aspects 2. Explain the differences between acid and base theories: Arrhenius, Bronsted Lowry, Lux-Flood, Usanofich, Lewis, soft and hard acids and bases 3. Explain the process of dissolving compounds, both ionic and covalent 4. Explain the effect of temperature on solubility 5. Explain the mechanism of dissolving compounds in water 6. Explain the types of reactions based on the solvent	**Criteria:** participation and tasks	discussion and questions and answers 3 X 50			0%

11	Understand the principles of chemical reactions, acid-base theory, acid strength, dissolution processes, reactions in water and non-water solvents	1. Explain the occurrence of chemical reactions based on thermodynamic aspects and kinetic aspects 2. Explain the differences between acid and base theories: Arrhenius, Bronsted Lowry, Lux-Flood, Usanofich, Lewis, hard and soft acids and bases 3. Explain the process of dissolving compounds, both ionic and covalent 4. . Explain the effect of temperature on solubility 5. Explain the mechanism of dissolving compounds in water 6. Explain the types of reactions based on the solvent.	**Criteria:** participation and tasks	discussion and questions and answers 3 X 50			0%
12	Understanding oxidation-reduction reactions of inorganic compounds and predicting the magnitude of the reaction from electrode potential values	1. Explain several concepts of oxidation-reduction reactions. 2. Predict the occurrence of chemical reactions based on the value of changes in free energy from the electrode potential or oxidation potential. 3. Differentiate between cell potential and electrode potential. Standard electrode potential values are given. 4. Calculate the equilibrium constant of a reaction. 5. Explain changes in pH and the value of Eo. 6. Calculate Eo from the EMF diagram.	**Criteria:** participation and tasks	summarizing, discussion and questions and answers 3 X 50			0%

13	Understanding oxidation-reduction reactions of inorganic compounds and predicting the magnitude of the reaction from electrode potential values	1. Explain several concepts of oxidation-reduction reactions. 2. Predict the occurrence of chemical reactions based on the value of changes in free energy from the electrode potential or oxidation potential. 3. Differentiate between cell potential and electrode potential. Standard electrode potential values are given. 4. Calculate the equilibrium constant of a reaction. 5. Explain changes in pH and the value of Eo. Calculate Eo from the EMF diagram.	**Criteria:** participation and tasks	Summarize literature and practice questions 3 X 50			0%
14	Understand the phenomena of solid systems which include ionic and covalent solids and their conductivity properties	1. Name the various crystal systems 2. Determine the Miler and Weiss index of a crystal plane 3. Determine the number of particles and particle volume in a crystal. 4. Explain the use of Schottky and Frenkel defects as semiconductor materials 5. Explain the differences in the properties of conductors, insulators and semiconductors and super-conductors with band theory	**Criteria:** participation and tasks	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			0%
15	Create concept maps about solid systems, draw crystal planes, calculate Miller and Weiss indices Discuss and draw various types of ionic solids	1. Name the various crystal systems 2. Determine the Miler and Weiss index of a crystal plane 3. Determine the number of particles and particle volume in a crystal. 4. Explain the use of Schottky and Frenkel defects as semiconductor materials 5. Explain the differences in the properties of conductors, insulators and semiconductors and super-conductors with band theory	**Criteria:** participation and tasks	discussion and questions and answers 3 X 50			0%
16	do the UAS questions correctly		**Criteria:** UAS scores	3 X 50			0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

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.
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.
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** 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.