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

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Inorganic Synthesis	4710200010		T=3	P=0	ECTS=6.72	1	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Prof. Dr. Nuniek Herdyastuti, M.Si.

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	This course discusses introduction, crystallography, solid-vapor reactions, solid-liquid reactions, solid-solid reactions, nanomaterial synthesis, and material characterization including reactions and synthesis of inorganic compounds along with their characterization using various analytical instruments. The form of the learning process is lectures and seminars with varied learning models (discovery, project and problem based learning) depending on competency achievements. 1. Formation of solids from solutions and melts (glass, precipitation, biomaterials, solvothermal, sol-gel) 2. Preparation and modification of inorganic polymers (general aspects, polysiloxanes (Silicones), polyphosphazenes, polysilanes, metal-containing polymers) Template method synthesis (synthesis of porous materials), synthesis of nanomaterials. Course assignments consist of routine assignments, critical book reports, journal article reviews, idea engineering, mini research, and projects.
References	**Main :**

1. Bodie Douglas, Darl McDaniel, John Alexander, 1994, Concept and Model of Inorganic Chemistry, 3nd edition, John Wiley & Sonns, Inc.
2. Catherine E, Housecroft, Alan G, Sharpe, 2005, Inorganic Chemistry, 2nd edition, Pearson Prentice Hall.
3. Day, Jr. Mc., and Selbin, Jr.,1969,Theoretical Inorganic Chemistry, 2nd edition, New York
4. Cotton & Wilkinson, 1989, Kimia Anorganik dasar, Penterjemah Sahati Suharto, UI-Press, Jakarta
5. Huheey, EJ., 1993, Inorganic Chemistry, 4th edition, Harper Collins Colloge
6. http//:www.wikipedia
7. http//:www.Google
8. Lisnawaty Simatupang, 2015, Kimia Anorganik II, Unimed Press, Medan
9. Retno DS, Sugyarto, KH., 2002, Kimia Anorganik II, FMPA UNY, Yogyakarta
10. . Saito Taro, 2007, Buku Teks Kimia Anorganik Online terjemahan oleh: Ismunandar, Chem Dept. ITB Bandung

	Supporters:
Supporting lecturer	Dr. Amaria, M.Si. Prof. Dr. Sari Edi Cahyaningrum, M.Si.

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	Able to describe an introduction to inorganic synthesis and analyze each component, especially the precursor, precursor and solvent	Determine the type of material that is part of the inorganic material. Analyze the type of precursor that comes from solid, liquid and gaseous materials. Identify the type of solvent used, including polar, nonpolar, protic and aprotic solvents. Analyze the additives used to produce homogeneous materials	**Criteria:** Student participation and assignment assessment	Lectures, discussions, questions and answers and assignments Method: Problem Based Learning 3 X 50			0%
2	Able to describe an introduction to inorganic synthesis and analyze each component, especially the precursor, precursor and solvent	Determine the type of material that is part of the inorganic material. Analyze the type of precursor that comes from solid, liquid and gaseous materials. Identify the type of solvent used, including polar, nonpolar, protic and aprotic solvents. Analyze the additives used to produce homogeneous materials	**Criteria:** Student participation and assignment assessment	Lectures, discussions, questions and answers and assignments Method: Problem Based Learning 3 X 50			0%
3	Able to describe the meaning of crystallography, crystals, crystal systems, unit cells, primitive cells, non-primitive cells, and Miller indices as well as designing Idea Engineering Assignments	Describe the meaning of crystallography Analyze crystal structures, bases and 1D, 2D, 3D crystal planes. Describe crystal systems and unit cells including symmetry elements, simple cubic Bravais lattices, bcc and fcc Able to analyze the differences between primitive and non-primitive cells Analyzing miller indices based on planes and cubic lattices Designing Engineering Assignments Ideas related to crystallography	**Criteria:** Assessment of participation during lectures and assignments	Method: Project Based Learning 3 X 50			0%

4	Able to describe the meaning of crystallography, crystals, crystal systems, unit cells, primitive cells, non-primitive cells, and Miller indices as well as designing Idea Engineering Assignments	Describe the meaning of crystallography Analyze crystal structures, bases and 1D, 2D, 3D crystal planes. Describe crystal systems and unit cells including symmetry elements, simple cubic Bravais lattices, bcc and fcc Able to analyze the differences between primitive and non-primitive cells Analyzing miller indices based on planes and cubic lattices Designing Engineering Assignments Ideas related to crystallography	**Criteria:** Assessment of participation during lectures and assignments	Method: Project Based Learning 3 X 50			0%
5	Able to analyze solid liquid reactions in the form of sol gel, coating, solvothermal, hydrothermal, sonochemical and micro emulsion methods	Analyzing the sol gel method Analyzing the coating method Analyzing the solvothermal method	**Criteria:** Assessment of student participation during lectures and assessment of assignments	Method: Project Based Learning 3 X 50			0%
6	Able to analyze solid liquid reactions in the form of sol gel, coating, solvothermal, hydrothermal, sonochemical and micro emulsion methods	Analyzing the sol gel method Analyzing the coating method Analyzing the solvothermal method	**Criteria:** Assessment of student participation during lectures and assessment of assignments	Method: Project Based Learning 3 X 50			0%
7	Able to analyze solid liquid reactions in the form of sol gel, coating, solvothermal, hydrothermal, sonochemical and micro emulsion methods	Analyzing the sol gel method Analyzing the coating method Analyzing the solvothermal method	**Criteria:** Assessment of student participation during lectures and assessment of assignments	Method: Project Based Learning 3 X 50			0%
8	UTS	UTS	**Criteria:** 1. The mid-semester exam is carried out once to assess all indicators 2. relevant through a written exam, averaged and weighted (2).	3 X 50			0%
9	Able to analyze solid liquid reactions in the form of sol gel, coating, solvothermal, hydrothermal, sonochemical and micro emulsion methods	Analyzing hydrothermal methods Analyzing sonochemical methods Analyzing microemulsion methods	**Criteria:** Assessment of participation during lectures and assignment work	Method: Project Based Learning 3 X 50			0%
10	Able to analyze solid liquid reactions in the form of sol gel, coating, solvothermal, hydrothermal, sonochemical and micro emulsion methods	Analyzing hydrothermal methods Analyzing sonochemical methods Analyzing microemulsion methods	**Criteria:** Assessment of participation during lectures and assignment work	Method: Project Based Learning 3 X 50			0%

11	Able to analyze solid solid reactions in the form of ceramic methods, alloying, combustion synthesis, and microwave methods through presentation of solution results. Able to describe nanomaterial synthesis including top down methods for fabricating nanocrystalline materials and bottom up for nanostructured solids	Analyze ceramic methods, Analyze alloying methods, Analyze combustion synthesis methods, Analyze microwave methods Describe top down methods for fabricating nanocrystalline materials Describe bottom up methods for nanostructured solids	**Criteria:** Participation during lectures and assignment assessments	Method: Project Based Learning 3 X 50			0%
12							0%
13	Able to analyze solid solid reactions in the form of ceramic methods, alloying, combustion synthesis, and microwave methods through presentation of solution results. Able to describe nanomaterial synthesis including top down methods for fabricating nanocrystalline materials and bottom up for nanostructured solids	Analyze ceramic methods, Analyze alloying methods, Analyze combustion synthesis methods, Analyze microwave methods Describe top down methods for fabricating nanocrystalline materials Describe bottom up methods for nanostructured solids	**Criteria:** Participation during lectures and assignment assessments	Method: Project Based Learning 3 X 50			0%
14	Able to analyze material characterization in the form of TGA, XRD, FTIR, SEM, and TEM tools through completing Critical Journal Report Assignments	Able to analyze material characterization with TGA, XRD, FTIR, SEM, and TEM instruments Able to complete Critical Journal Report Assignments	**Criteria:** Participation during lectures and completion of assignments	Method: Project Based Learning 3 X 50			0%
15	Able to analyze material characterization in the form of TGA, XRD, FTIR, SEM, and TEM tools through completing Critical Journal Report Assignments	Able to analyze material characterization with TGA, XRD, FTIR, SEM, and TEM instruments Able to complete Critical Journal Report Assignments	**Criteria:** Participation during lectures and completion of assignments	Method: Project Based Learning 3 X 50			0%

16	UAS	UAS	**Criteria:** 1.UAS is carried out once to assess all relevant indicators 2.written exam, averaged from the lecturer team of each MK Metpen supervisor and 3.given a weight of (3). 4.2. NA is (participation value x2) (Assignment value x 3) (USS value x 2) UAS value 5.(3) divided by 10.	WRITING TEST 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.