

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

Document Code

SEMESTER LEARNING PLAN

Courses		CODE			Cour	se Fa	mily		C	Cred	it We	ight	s	EMES	TER	Co Da	mpilatior te
Core Chemis Radiochemis		472010210	3		Study Cour		gram E	Electiv	e 1	Г=2	P=0	ECTS=3.	18	4	4	Jul	y 27, 202
AUTHORIZA	TION	SP Develo	per					Co	urse	Clus	ster C	oordinato	r S	Study F	Progra	m Coc	rdinator
		Samik, S.S D.Sc.	i., M.S	i; Herry W	ijayan	to, M.	Sc.,	Pro M.S		. Nur	iiek H	erdyastuti,		[Dr. Am	aria, M	.Si.
Learning model	Project Based Le	arning															
Program	PLO study prog	ram that is char	ged to	the cou	rse												
Learning Outcomes	Program Object	ives (PO)	•														
(PLO)	PO - 1	Utilizing learning implementation of learning, inquiry-di	core	chemistry	/ in e	veryḋ	ay life	e, scie	entific	; app	oroac	h-oriented	learr	ning su	uch as	: prob	Íem-base
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	PO - 4	Have a responsit everyday life.	le attit	ude by ir	nplem	enting	y way:	s to o	verco	ome	the r	negative in	npact	s of u	sing ra	udio ch	iemistry i
	PO - 5	Have the ability to and radiochemistr											on to	pics re	elated t	o core	chemistr
	PLO-PO Matrix																
		P.O PO-1 PO-2 PO-3 PO-4 PO-5															
	PO Matrix at the	e end of each lea	rning	stage (S	ub-P(D)											
		P.O								We	ek						
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Short Course Description	stability, nuclear r radiation with ma	logy, epistemology eactions, half-life tter, and the imple echnology and so o	and agementation	ge of radi	oactiv	e elei	ments	, therr	nody	nam	ic sta	bility of at	omic	nuclei	, intera	action	of nuclea
References	Main :																

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		Supporters:						
Support lecturer		ISMONO Samik, S.Si., M.S Herry Wijayanto, 3	i. S.Pd., M.Sc., D.Sc.					
Week-	eac sta		Eva	aluation	Lear Studer	Ip Learning, ning methods, nt Assignments, stimated time]	Learning materials	Assessment Weight (%)
	(Su	b-PO)	Indicator	Criteria & Form	Offline(offline)	Online (<i>online</i>)		
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	de ch rac co by sc (or ep ax co the ato	amining the finition of core emistry and diochemistry mprehensively answering 3 ientific questions tology, istemology, and iology) mplemented by e history of omic theory and e discovery of dioactivity	 Defines core chemistry and radiochemistry which contains 3 answers to questions of ontology, epistemology and axiology. Explains the history of atomic theory and the discovery of radioactivity Distinguish between chemical reactions and nuclear reactions 	Criteria: Qualitative Form of Assessment : Practice/Performance, Test	1. Lecture 2. Question and answer 3. Practice questions 2 x 50 minutes		Material: Defining core chemistry and radiochemistry which contains 3 answers to questions of ontology, epistemology and axiology. Bibliography: Arthur, 1981 Concepts of Modern Physics, third edition Erlangga, Jakarta. Material: Explaining the history of atomic theory and the discovery of radioactivity. Reference: Choppin, Liljenzin, and Rydberg, 2002, Radiochemistry and Nuclear Chemistry, 3rd Edition, Butterworth- Heinemann Press Material: Differentiating chemical reactions and nuclear reactions References: Kratz, Karl Heinrich Lieser, 2012, Nuclear and Radiochemistry: Fundamentals and Applications, 2 Volume Set, Wiley VCH, Verlag GmbH, and Co KgaA, Boschstr, 12 Weinheim, Germany	7%

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3	Explain the atomic nucleus and nuclear stability	 Distinguish between the terms atomic nucleus, nucleon and nuclide Distinguish between isotopes, isobars, isotones and cuelear 	Criteria: Quantitative Form of Assessment : Portfolio Assessment, Test	 Lecture Question and answer Discussion Practice questions x 50 minutes 	Material: Includes all indicators References: Arthur, 1981 Concepts of Modern Physics, third edition Erlangga, Jakarta.	
		nuclear isomers 3.Classify stable and radioactive nuclides 4.Understand the factors that influence core stability			Material: Includes all indicators References: Choppin, Liljenzin, and Rydberg, 200 Radiochemis and Nuclear Chemistry, 31 Edition, Butterworth- Heinemann Press)2, try
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4	Understand core reactions	1.Distinguish	Criteria:	1. Lecture	Material:	7%
	reactions	and give	In accordance with the assessment	2. Question	Includes all	
		examples of	guidebook that applies	and answer	indicators	
		nuclear decay	at Unesa	3. Solve	References:	
		reactions and	ui onesu	questions	Arthur, 1981	
		nuclear	Form of Assessment :	2 x 50	Concepts of	
		transmutation	Test	minutes	Modern	
		reactions	1000		Physics, third	
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		the process of			Liljenzin, and	
		its formation			Rydberg, 2002,	
		in nature			Radiochemistry	
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5	Differentiate the	1.Determine the	Criteria:	1. Lecture	Material:	7%
	rate of decay of	decay formula	Quantitative	2. Question	Includes all	
	atomic nucléi, half-	-	C C	and answer	indicators	
	life, and radioactive	from the rate	Form of Assessment :	3. Solve	References:	
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					Liljenzin, and	
					Rydberg, 2002,	
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6 Analyze interactic nuclear r with mat	on of difference	Criteria: Quantitative Form of Assessment : Participatory Activities, Tests	1. Lecture 2. Discussion 3. Question and answer 4. Practice questions 2 x 50 minutes	Material:7%Includes all indicators7%References:7%Arthur, 19817%Concepts of Modern7%Physics, third edition7%Erlangga, Jakarta.7%Material:7%
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				Material: Includes all indicators References: Kratz, Karl Heinrich Lieser, 2012, Nuclear and Radiochemistry: Fundamentals and
				Applications, 2 Volume Set, Wiley VCH, Verlag GmbH, and Co KgaA, Boschstr, 12 Weinheim, Germany
				Material: Includes all indicators Bibliography: Gregory Choppin, Jan- Olov Liljenzin Jan Rydberrg and, Christian Ekberg, 2013,
				Radiochemistry and Nuclear Chemistry, Fourth Edition ISBN-13: 978- 0124058972 ISBN-10: 0124058973

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7	Analyze the thermodynamic stability of the atomic nucleus	 1.Compare the energy produced between chemical reactions and nuclear reactions 2.Calculating mass-energy balance 3.Calculate the binding energy of atomic nuclei 4.Distinguish between nuclear fission and fusion reactions 	Criteria: Quantitative Form of Assessment : Test	1. Lecture 2. Question and answer 3. Practice questions 2 x 50 minutes	Material: Includes all indicatorsReferences: Arthur, 1981 Concepts of Modern Physics, third edition Erlangga, Jakarta.Material: Includes all indicatorsMaterial: Includes all indicatorsReferences: Choppin, Liljenzin, and Rydberg, 2002, Radiochemistry and Nuclear Chemistry, 3rd Edition, Butterworth- Heinemann PressMaterial: Includes all indicatorsMaterial: References: Chopin, Liljenzin, and Rydberg, 2002, Radiochemistry and Nuclear Chemistry, 3rd Edition, Butterworth- Heinemann PressMaterial: 	8%
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8	Able to work on and complete Midterm Exam (UTS) questions	Able to solve UTS questions well and correctly	Criteria: In accordance with the assessment guidelines applicable at UNESA Form of Assessment : Test	Work on and complete 2 x 50 minute UTS questions	Material: Includes all indicators References: Arthur, 1981 Concepts of Modern Physics, third edition Erlangga, Jakarta. Material: Includes all indicators References: Choppin, Liljenzin, and Rydberg, 2002, Radiochemistry, and Nuclear Chemistry, 3rd Edition, Butterworth- Heinemann Press Material: Includes all indicators References: Kratz, Karl Heinrich Lieser, 2012, Nuclear and Radiochemistry: Fundamentals and Applications, 2 Volume Set, Wiley VCH, Verlag GmbH, and Co KgaA, Boschstr, 12 Weinheim, Germany Material: Includes all indicators Bibliography: Gregory Choppin, Jan- Olov Liljenzin Jan Rydberrg and, Christian Ekberg, 2013, Radiochemistry, Fourth Edition ISBN-13: 978- 0124058973 Naterial: Naterial: Naterial: Rediconsemistry Fourth Edition SISBN-10: 0124058973 Naterial: Naterial: Naterial: Naterial: Naterial: Nuclear Chemistry, Fourth Edition SISBN-10: 0124058973 Naterial: Naterial: Naterial: Naterial: Radiochemistry San-10: 0124058973 Naterial: Naterial: Naterial: Naterial: Naterial: Radiochemistry San-10: Naterial	0%
9	Compile scientific review articles related to the application of core chemistry and radiochemistry in everyday life such as industry, medicine, agriculture, and so on	 Able to compile the background of the problem Able to formulate problem formulations Able to formulate research objectives Able to make point drafts from review articles 	Criteria: In accordance with the assessment guidelines that apply at Unesa Form of Assessment : Project Results Assessment / Product Assessment	Discussion, presentation and consultation 2 x 50 minutes	Material: Includes all indicators Literature: Other recent, relevant books and journals Material: Includes all indicators References: Darmawan, Deni, 2019, Techniques for Writing Scientific Papers, Bandung: Teen Rosdakarya	8%

10	Compile scientific review articles related to the application of core chemistry and radiochemistry in everyday life such as industry, medicine, agriculture, and so on	 Able to compile theoretical studies supporting research Able to compile relevant research results Able to develop a framework for thinking Able to write draft review articles 	Criteria: Quantitative Form of Assessment : Project Results Assessment / Product Assessment	Discussion, presentation and consultation 2 × 50 minutes	releva and jo Mater Includ indica Refer Darma Deni, Techn Writin Scient Paper	es all tors ture: recent, nt books urnals ial: es all tors ences: awan, 2019, iques for g ific s, s, mg: Teen	7%
11	Able to compile literature reviews and write draft review articles related to the implementation of radiochemistry in everyday life such as industry, medicine, agriculture, and so on.	 Able to compile theoretical studies supporting research Able to compile relevant research results Able to develop a framework for thinking Able to write draft review articles 	Criteria: Quantitative Form of Assessment : Project Results Assessment / Product Assessment	Project Based Learning, Discussion, presentation and consultation 2 x 50 minutes	releva and jo Mater Includ indica Refer Darma Deni, Techn Writin Scient Paper	es all tors ture: recent, nt books urnals ial: es all tors ences: awan, 2019, iques for g ific s, s, mg: Teen	7%
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15	Able to compile literature reviews and write draft review articles related to the implementation of radiochemistry in everyday life such as industry, medicine, agriculture, and so on.	 Able to compile theoretical studies supporting research Able to compile relevant research results Able to develop a framework for thinking Able to write draft review articles Prepare accompanying documents for submission of review articles 	Criteria: Quantitative Form of Assessment : Project Results Assessment / Product Assessment	Project Based Learning, Discussion, presentation and consultation 2 x 50 minutes	Material: Includes all indicators Literature: Other recent, relevant books and journals Material: Includes all indicators References: Darmawan, Deni, 2019, Techniques for Writing Scientific Papers, Bandung: Teen Rosdakarya	7%
16	UAS	UAS	Criteria: UAS Form of Assessment : Project Results Assessment / Product Assessment	Assistance in selecting the destination journal for publication 2 x 50		0%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	7%
2.	Project Results Assessment / Product Assessment	50%
3.	Portfolio Assessment	3.5%
4.	Practice / Performance	3.5%
5.	Test	36%
		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. 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.