

		Universitas Negeri Surabaya Faculty of Mathematics and Natural Sciences Undergraduate Chemistry Study Program						Document Code																																										
SEMESTER LEARNING PLAN																																																		
Courses		CODE	Course Family		Credit Weight		SEMESTER	Compilation Date																																										
Mathematics For Chemistry		4720103137			T=3	P=0	ECTS=4.77	2	July 18, 2024																																									
AUTHORIZATION		SP Developer		Course Cluster Coordinator		Study Program Coordinator																																												
						Dr. Amaria, M.Si.																																												
Learning model	Project Based Learning																																																	
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																																	
	Program Objectives (PO)																																																	
	PLO-PO Matrix																																																	
		<div style="border: 1px solid black; padding: 5px; display: inline-block;">P.O</div>																																																
	PO Matrix at the end of each learning stage (Sub-PO)																																																	
		<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th rowspan="2">P.O</th> <th colspan="16">Week</th> </tr> <tr> <th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th><th>11</th><th>12</th><th>13</th><th>14</th><th>15</th><th>16</th> </tr> </table>																P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
P.O	Week																																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																																		
Short Course Description	Study of mathematics to underlie Chemistry courses which include Functions and Differential Calculus, Integral Calculus, Multivariable Calculus, Operators, Matrices and Determinants, Group Theory, Series and special functions, Transformations and their Application in Chemistry through simple studies and engineering.																																																	
References	Main :																																																	
	1. David Z. Goodson, 2011, Mathematical Methods for Physical and Analytical Chemistry, John Wiley & Sons, New Jersey 2. Robert G Mortimer, 2005, Mathematics for Physical Chemistry, 3th ed, Elsevier Inc, USA. 3. Irwin Krizig, 1989, Advanced Mathematic for Physicist and Engineering, 4th ed, John Wiley & Sons Inc, New York.																																																	
	Supporters:																																																	
Supporting lecturer	Prof. Dr. Pirim Setiarso, M.Si. Dr. I Gusti Made Sanjaya, 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	Understand the mathematical orientation of chemistry	Explain the achievement targets for chemistry mathematics	Criteria: participation assessment	1 X 1 presentation and discussion			0%																																											

2	Understand functions and limits and their applications in chemistry	Analyze the types of functions and ideas about limits in chemistry	Criteria: assignment assessment and participation	Presentation and practice solving 3 X 50 questions			0%
3	Understand the concept of derivatives and their application in chemistry	Evaluating the derivative of a function and the maximum-minimum values of turning points and inflection points in chemistry	Criteria: assignment assessment and participation	Presentation and practice questions 3 X 50			0%
4	Understand calculus and differential equations and their applications in chemistry	Analyze calculus and differential equations related to chemistry	Criteria: assignment assessment and participation	Presentation and practice solving 3 X 50 questions			0%
5	Understand integral concepts and their application in chemistry	Proving anti-derivatives and integration processes in chemistry	Criteria: task assessment and participation	Presentation and practice solving 3 X 50 questions			0%
6	Understand various integration methods and their applications in chemistry	Evaluate the results of normal-unnatural integration with various methods applied in chemistry	Criteria: assignment assessment and participation	Presentation and practice on solving 3 X 50 questions			0%
7	Understand the derivative of multivariable functions and the use of exact differential equations	Analyzing partial derivatives and the application of exact differential equations in chemistry	Criteria: assignment assessment and participation	Presentation and practice questions 3 X 50			0%
8			Criteria: UTS assessment	2 X 50			0%
9	Understand line integrals and fold integrals and their applications in chemistry	Evaluate the integration results of line integrals and fold integrals and their application in chemistry	Criteria: assignment assessment and participation	Presentation and practice questions 3 X 50			0%
10	Understand the function and work of operators in chemistry	Analyzing operator work in chemistry	Criteria: assignment assessment and participation	Discussion presentation, and practice questions 3 X 50			0%
11	Understand the types, properties and operations of matrices and their applications in chemistry	Analyze the types, properties and results of matrix operations found in chemistry	Criteria: assignment assessment and participation	Presentation and practice questions 3 X 50			0%
12	Understand determinants and their application in chemistry	Analyzing matrix determinants and their application in chemistry	Criteria: assignment assessment and participation	Presentation, discussion and practice questions 3 X 50			0%
13	Understand vectors and tensors and their applications in chemistry	Analyze the properties and operations of vectors and tensors found in chemistry	Criteria: assignment assessment and participation	Presentation, discussion and practice questions 3 X 50			0%
14	Understand sequences, series and special functions and their applications in chemistry	Analyze sequences, series and special functions and their applications in chemistry	Criteria: assignment assessment and participation	Presentation, discussion and practice questions 3 X 50			0%

15	Understand transformations and their applications in chemistry	Analyze transformations and their applications in chemistry	Criteria: assignment assessment and participation	Presentations, discussions and practice questions. 3 X 50			0%
16			Criteria: UAS assessment	2 X 50			0%

Evaluation Percentage Recap: Project Based Learning

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.