

**SEMESTER STUDY PLAN
GENERAL CHEMISTRY
(COMPULSORY COURSE)**



**DEPARTMENT OF MATHEMATICS AND DATA SCIENCE
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
UNIVERSITAS ANDALAS**

2024



SEMESTER STUDY PLAN (SSP)
BACHELOR PROGRAM OF MATHEMATICS
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
UNIVERSITAS ANDALAS

Course Name		Course Code	URL I-Learn	Credits	Semester	Compilation Date
General Chemistry		MAT61106	https://sci.ilearn.unand.ac.id	2	1	15 May 2024
Person In Charge		Study Plan Creator		Head of Research Group		Head of Study Program
		Prof. Dr. Zilfa Prof. Dr. Deswati Dr. Yefrida		Prof. Dr. Deswati		Dr. Noverina Alfiany
Intended Learning Outcomes (ILO) and Performance Indicator (PI)	Intended Learning Outcomes					
	ILO-2	Possesses profound knowledge of the basic concept mathematics PI-1: An ability to explain basic mathematical concepts PI-2: An ability to provide examples that are relevant to basic mathematical concepts PI-3: An ability to determine solutions to simple problems using basic mathematical concepts				
	ILO-4	An ability to use concept and fundamental technique of mathematics in solving simple mathematical problems PI-1: An ability to choose appropriate basic mathematical concepts and techniques in solving simple mathematical problems PI-2: An ability to illustrate simple mathematical problems based on appropriate basic mathematical concepts and techniques PI-3: An ability to solve simple mathematical problems using appropriate basic mathematical concepts and techniques				
	Course Learning Outcomes					
	1	An ability to explain the basic concepts of chemistry, chemical equations, stoichiometry of reactions, chemical reactions, atomic structure, periodic system, and chemical bonding before mid-semester.				

	2	An ability to solve chemical calculations based on dimensional analysis methods before mid-semester.
	3	An ability to classify chemical reactions before mid-semester.
	4	An ability to perform calculations in thermodynamics, chemical kinetics, chemical equilibrium, acid-base and salt chemistry, and electrochemistry after mid-semester.
Brief Description	This course provides experience for students to know more about the fundamental concepts of chemistry, chemical equations and stoichiometry of reactions, chemical reactions, atomic structure, periodic system, chemical bonding, thermochemistry, chemical kinetics, acid-base chemistry, solubility product, and electrochemistry	
Course Materials	1. Basic concepts of chemistry 2. Chemical equations and stoichiometry of reactions 3. Chemical reactions 4. Atomic structure and periodic system 5. Chemical bonding 6. Thermochemistry 7. Chemical kinetics 8. Chemical equilibrium 9. Acid-base and salt chemistry 10. Electrochemistry	
References	Main: 1. Whitten, W.W., R.E. Davis, M.L. Peck, G.G. Stainley, Chemistry, Edisi 10, 2013. 2. Brown, T.L., H.E. Lemay, Jr, B.E. Bursten, C.J. Murphy, Chemistry : The Central Science, Edisi 13, 2014 Additional: 3. Chang, R., 2004, KIMIA DASAR (konsep-konsep inti), The third edition, Volume 1 and 2, Erlangga, Jakarta 4. Oxtoby, D. W (2001). Kimia Modern, (The fourth edition), Erlangga, Jakarta	
Learning Media	Software:	Hardware:
	• LMS Unand (http://fmipa.ilearn.unand.ac.id/)	• Computer/Laptop • Smartphone

	• Zoom meeting • Whatsapp	
Team Teaching	1. Prof. Dr. Zilfa 2. Prof. Dr. Deswati 3. Dr. Yefrida	
Assessment	-	
Required courses	-	
Academic Norms	https://akademik.unand.ac.id/images/2022-03-30%20Peraturan%20Rektor%20Nomor%207%20Tahun%202022%20Penyelenggaraan%20Pendidikan-khusus%20Bab%20II.pdf	

Weekly Study Plan

Week / Meet (1)	Course Outcomes (2)	Indicator (3)	Assessment (4)	Activities/Forms of Learning [Time estimated]					Subject, references (10)	Weight (11)
				Synchronous*		Asynchronous**		Media (9)		
				Face to face Offline (5)	Face to face Online (6)	Individual (7)	Collaboration (8)			
1	CLO-1 An ability to explain the basic concepts of chemistry	• Accuracy in explaining matter and energy, as well as the laws related to them • Accuracy in explaining the units of measurement	Participation Mid-term Exam: 5%	Teaching and discussion: • Introduction to the Course Syllabus (RPS). • Delivery of material • Discussion and Q&A		Students search for references and study learning materials [1 x 2 x 60 minutes]	Students discuss learning materials and assignments in groups [1 x 2 x 60 minutes]	• LMS (ilearn UNAND)	1. Basic Concepts of Chemistry • Matter and Energy • Measurements in Chemistry • Dimensional Analysis Methods	

		t used in chemistry • Accuracy in using dimensional analysis methods to solve calculations		[1 x 2 x 50 minutes]						
2	CLO-1, CLO-2 An ability to explain chemical equations and reaction stoichiometry	• Accuracy in creating and naming chemical compounds • Accuracy in explaining the concept of mole and its use in chemical calculations • Accuracy in explaining the forms of chemical equations and their meanings • Accuracy in explaining the concept of reaction stoichiometry	Participation Mid-term Exam: 5% Individual assignment	Teaching and discussion: • Delivery of material • Discussion and Q&A [1 x 2 x 50 minutes]		Students search for references and study learning materials [1 x 2 x 60 minutes]	Students discuss learning materials and assignments in groups [1 x 2 x 60 minutes]	• LMS (ilearn UNAND)	2. Chemical equations and reaction stoichiometry • Chemical formulas • Concept of mole • Chemical equations • Reaction stoichiometry	

		and its use in chemical calculations								
3	CLO-2 An ability to solve chemical calculations using dimensional analysis methods before mid-semester	• Accuracy in performing chemical calculations using dimensional analysis methods	Participation Mid-term Exam: 5% Individual assignment Quizzes	Teaching and discussion: • Delivery of material • Discussion and Q&A [1 x 2 x 50 minutes]		Students search for references and study learning materials [1 x 2 x 120 minutes]		• LMS (ilearn UNAND)		
4	CLO-3 An ability to classify chemical reactions before mid-semester	• Accuracy in explaining types of chemical reactions • Accuracy in classifying chemical reactions	Participation Mid-term Exam: 5%	Teaching and discussion: • Delivery of material • Discussion and Q&A [1 x 2 x 50 minutes]		Students search for references and study learning materials [1 x 2 x 120 minutes]		• LMS (ilearn UNAND)	3. Chemical Reactions • Metals, nonmetals, and metalloids • Reactions in solution • Classification of chemical reactions	
5	CLO-1, CLO-3 An ability to explain atomic structure and the periodic system	• Accuracy in explaining theories about the atom • Accuracy in explaining the	Participation Mid-term Exam: 5% Individual assignment	Teaching and discussion: • Delivery of material • Discussion and Q&A		Students search for references and study learning materials		• LMS (ilearn UNAND)	4. Atomic Structure and Periodic System • Subatomic particles	

		subatomic particles • Accuracy in determining the quantum numbers of electrons • Accuracy in creating electron configurations • Accuracy in explaining the periodic properties of elements and the trends within a group or period		[1 x 2 x 50 minutes]		[1 x 2 x 120 minutes]			• Electromagnetic radiation • Quantum numbers and electron configuration • Atomic and ionic radii • Ionization energy • Electron affinity • Electronegativity	
6	CLO-1, CLO-4 An ability to explain chemical bonding	• Accuracy in explaining the types of chemical bonds • Accuracy in determining the type of bond present in an element or compound	Participation Mid-term Exam: 5% Individual assignment	Teaching and discussion: • Delivery of material • Discussion and Q&A [1 x 2 x 50 minutes]		• Students search for references and study learning materials • Completing assigned tasks [1 x 2 x 120 minutes]		• LMS (ilearn UNAND)	6. Chemical Bonding • Lewis structure and molecular structure • Ionic bonding • Covalent bonding	

		Accuracy in creating Lewis structures of elements or ions								
7	-	-	-	Teaching and discussion: - Delivery of material - Discussion and Q&A [1 x 2 x 50 minutes]		Students search for references and study learning materials [1 x 2 x 60 minutes]	Students discuss learning materials and assignments in groups [1 x 2 x 60 minutes]	LMS (ilearn UNAND)	7. Review and Discussion of Questions	
8	MID-TERM EXAM									
9	An ability to perform calculations in thermochemistry	- Accuracy in explaining the relationship between energy and chemical reactions - Accuracy in explaining thermochemical equations - Accuracy in calculating reaction enthalpy based on Hess's law	Participation Final Exam: 5%	Teaching and discussion: - Delivery of material - Discussion and Q&A [1 x 2 x 50 minutes]		Students search for references and study learning materials [1 x 2 x 120 minutes]		LMS (ilearn UNAND)	9. Thermochemistry - Relationship between energy and chemical reaction - Reaction enthalpy - Thermochemical equations - Hess's Law	

10	An ability to perform calculations in chemical kinetics	• Accuracy in explaining reaction rate, reaction order, and rate equations • Accuracy in determining the rate equation • Accuracy in performing integrated rate law calculations	Participation Final Exam: 5% Individual assignment	Teaching and discussion: • Delivery of material • Discussion and Q&A [1 x 2 x 50 minutes]		Students search for references and study learning materials - [1 x 2 x 120 minutes]		• LMS (ilearn UNAND)	10. Chemical Kinetics • Reaction rate • Reaction order • Rate equations • Integrated rate laws	
11	An ability to perform calculations in chemical equilibrium	• Accuracy in explaining chemical equilibrium and its influencing factors • Accuracy in determining the values of K_p and K_c • Accuracy in performing calculations for reactions at equilibrium	Participation Final Exam: 5%	Teaching and discussion: • Delivery of material • Discussion and Q&A [1 x 2 x 50 minutes]		Students search for references and study learning materials [1 x 2 x 120 minutes]		• LMS (ilearn UNAND)	11. Chemical Equilibrium • Equilibrium constant • Factors affecting equilibrium • K_p and K_c	

12	An ability to perform calculations in acid-base and salt chemistry	• Accuracy in explaining acids, bases, and salts • Accuracy in establishing acid-base equilibrium • Accuracy in calculating the pH of acidic, basic, salt, buffer, and hydrolysis solutions	Participation	Teaching and discussion:		Students search for references and study learning materials		• LMS (ilearn UNAND)	12. Acid, Base, and Salt Chemistry	
13			Final Exam: 5%	• Delivery of material • Discussion and Q&A [1 x 2 x 50 minutes]		Students search for references and study learning materials		• LMS (ilearn UNAND)		
			Quizzes			[1 x 2 x 120 minutes]			• Types of acids and bases • Acid-base equilibrium • pH of acidic, basic, and salt solutions • Buffer solutions • Hydrolysis	
14	An ability to perform calculations in electrochemistry	• Accuracy in determining the oxidation numbers of elements (review) • Precision in explaining redox reactions • Accuracy in explaining Voltaic cells and	Participation	Teaching and discussion:		Students search for references and study learning materials		• LMS (ilearn UNAND)	13. Electrochemistry	
			Final Exam: 5%	• Delivery of material • Discussion and Q&A [1 x 2 x 50 minutes]		[1 x 2 x 120 minutes]			• Oxidation numbers • Redox reactions • Voltaic cells • Electrolytic cells	
			Individual assignment							

		electrolytic cells along with their calculations								
15	-	-	Individual assignment	Teaching and discussion: • Delivery of material • Discussion and Q&A [1 x 2 x 50 minutes]		• Students search for references and study learning materials • Completing assigned tasks [1 x 2 x 120 minutes]		• LMS (ilearn UNAND)	14. Review and discussion of problems	
Total Weight										100%
16	FINAL EXAM									

1 credit = 50 minutes face-to-face meeting, 60 minutes structured study, 60 minutes independent study
 Each meeting duration is 2 credits = 2×50 minutes

Indicators, Criteria, and Assessment Weights

1. Assessment weight for each Assessment

NO	Assessment	Weight (%)
1	Mid-Term Exam	35
2	Final Exam	35
3	Homework	15
4	Quizzes	15
TOTAL		100

2. Assessment weight for Intended Learning Outcome

- CLO-1: 20 %
- CLO-2: 5 %
- CLO-3: 5 %
- CLO-4: 30 %

Assessment Plan Table:

No.	CLO	Assessment	Weight (%)
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		Mid-Term Exam (%)	Final Exam (%)	Homework (%)	Quizzes (%)	
1	CLO-1	20				25
2	CLO-2	5		5	5	20
3	CLO-3	5		5		10
4	CLO-4		35	5	10	50
Total		35	35	15	15	100

Information:

TK: Group ask