



INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS)

FAKULTAS SAINS DAN ANALITIKA DATA
FACULTY OF SCIENCE AND DATA ANALYTICS

DEPARTEMEN KIMIA
DEPARTMENT OF CHEMISTRY

Kode
Dokumen

RENCANA PEMBELAJARAN SEMESTER

MATA KULIAH (MK) COURSE	KODE CODE	Rumpun MK COURSE GROUP	BOBOT (sks) CREDITS		SEMESTER SEMESTER	Tgl Penyusunan Compilation Date
KIMIA 1 CHEMISTRY-1	SK 224102	Umum General	3	0	I/II	24 Agustus 2022 24 August 2022
OTORISASI / PENGESAHAN AUTHORIZATION / LEGALIZATION	Dosen Pengembang RPS TLP Development Lecturer		Koordinator RMK Course Group Coordination		Ka PRODI Head of Study Program	
	Tim Dosen Kimia 1 Lecturer of Chemistry 1		Zjahra Vianita Nugraheni, M.Si.		Prof. Dr. rer. nat. Fredy Kurniawan, M. Si	
Capaian Pembelajaran Learning Outcomes (LO)	CPL-PRODI yang dibebankan pada MK PLO Charged to The Course					
	A.1 (CPL 1) A.1 (PLO 1)	Memiliki moral, etika, tanggung jawab dan kepribadian yang baik di dalam menyelesaikan tugasnya Able to report his/her own work in a good and discipline manners				
	B.3 (CPL 5) B.3 (PLO 5)	Bertanggungjawab pada pekerjaan sendiri dan dapat diberi tanggung jawab atas pencapaian hasil kerja organisasi Able to take responsibility for his/her own work and to give the responsibility of the achievement of an organization				
	D.1 (CPL 8) D.1 (PLO 8)	Mampu mengaplikasikan pola pikir kimia dan memanfaatkan IPTEK pada bidangnya dalam menyelesaikan masalah yang dihadapi Able to apply a chemistry mindset and utilize science and technology in their field and overcome problems that are faced.				
	Capaian Pembelajaran Mata Kuliah (CPMK) Course Learning Outcomes (CLO)					
CPMK 1	Mahasiswa mampu menggunakan prinsip-prinsip dasar ilmu kimia sebagai dasar dalam mempelajari ilmu yang berkaitan dengan kimia					
CLO 1	The students should be able to use the principles of basic chemistry knowledge as a basis to learn chemistry in which they will learn further throughout their whole studies.					

	CPMK 2 CLO 2	Mahasiswa dapat melakukan perhitungan-perhitungan dasar kimia <i>The students should be able to do the basic chemistry calculations.</i>																																															
Peta CPL – CP MK <i>PLO – CLO</i> <i>Mapping</i>	<table border="1"> <thead> <tr> <th></th> <th>CPL 1</th> <th>CPL 2</th> <th>CPL 3</th> <th>CPL 4</th> <th>CPL 5</th> <th>CPL 6</th> <th>CPL 7</th> <th>CPL 8</th> <th>CPL 9</th> </tr> <tr> <th></th> <th>PLO 1</th> <th>PLO 2</th> <th>PLO 3</th> <th>PLO 4</th> <th>PLO 5</th> <th>PLO 6</th> <th>PLO 7</th> <th>PLO 8</th> <th>PLO 9</th> </tr> </thead> <tbody> <tr> <td>CPMK 1 CLO 1</td> <td></td> <td></td> <td></td> <td></td> <td>√</td> <td></td> <td></td> <td>√</td> <td></td> </tr> <tr> <td>CPMK 2 CLO 2</td> <td>√</td> <td></td> <td></td> <td></td> <td>√</td> <td></td> <td></td> <td>√</td> <td></td> </tr> </tbody> </table>										CPL 1	CPL 2	CPL 3	CPL 4	CPL 5	CPL 6	CPL 7	CPL 8	CPL 9		PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	CPMK 1 CLO 1					√			√		CPMK 2 CLO 2	√				√			√	
	CPL 1	CPL 2	CPL 3	CPL 4	CPL 5	CPL 6	CPL 7	CPL 8	CPL 9																																								
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CPMK 2 CLO 2	√				√			√																																									
Diskripsi Singkat MK <i>Brief Course Description</i>	<p>Matakuliah ini mempelajari prinsip-prinsip dasar ilmu kimia meliputi teori atom, konfigurasi elektron, ikatan kimia, wujud zat dan perubahan fasa, reaksi kimia dan stoikiometri, Teori Asam Basa, Kesetimbangan Ionik dalam Larutan (Asam Basa, Kelarutan, Kompleks dan Pengendapan), Termodinamika Kimia, Kinetika Kimia dan Elektrokimia.</p> <p><i>This subject study the principles of the fundamental chemistry knowledge that covers the theory of atoms, the electron configurations, the different phases and, phase transitions, chemical reactions and stoichiometry, Acid-Base Theories, Ionic Equilibrium in Substances (Acid-Base, Solubility, Complex and Precipitation), Chemistry Thermodynamics, Chemical Kinetics and, Electrochemistry.</i></p>																																																
Bahan Kajian: Materi pembelajaran Study Material: <i>Subject Matter</i>	<p>Konsep Dasar Kimia, Model dan Struktur Atom, Konfigurasi Elektron dan Ikatan Kimia, Stoikiometri dan Reaksi Kimia, Wujud Zat dan Perubahan Fasa, Kesetimbangan Kimia, Teori Asam Basa, Kesetimbangan Ionik dalam Larutan (Asam Basa, Kelarutan, Kompleks dan Pengendapan), Termodinamika Kimia, Kinetika Kimia dan Elektrokimia.</p> <p><i>The Basic Concepts of Chemistry, Atom Structures and Models, Electron Configurations and Chemical Bonds, Stoichiometric and Chemical Reactions, Chemical Solutions, Concentrations and, Colligative Chemical Properties, Chemistry Equilibrium, The States of Matters and Phase Transformations, Acid-Base Theory, Ionic Equilibrium in Substances (Acid-Base, Solubility, Complex and Precipitation), Chemistry Thermodynamics, Chemical Kinetics, Electrochemistry.</i></p>																																																
Pustaka <i>References</i>	Utama: <i>Primary:</i>																																																
		<ol style="list-style-type: none"> 1. Tim Dosen Departemen Kimia, 2019. Kimia 1, Edisi ke-2, Media Bersaudara, Surabaya. (Untuk kelas Bahasa) 2. Tim Dosen Departemen Kimia, 2019. Chemistry, 1st edition, Media Bersaudara, Surabaya. (For IUP class) 																																															
	Pendukung: <i>Supporting:</i>																																																
		<ol style="list-style-type: none"> 1. Oxtoby, D.W., Gillis, H.P. and Campion, A., 2012. <i>Principles of Modern Chemistry</i>, Edisi ketujuh, Brooks/Cole. 																																															

	<p>Oxtoby, D.W., Gillis, H.P. and Campion, A., 2012. <i>Principles of Modern Chemistry</i>, 7th edition, Brooks/Cole.</p> <p>2. Chang, R. and Goldsby, K., 2012. <i>Chemistry</i>, Edisi kesebelas, McGraw-Hill, USA.</p> <p>Chang, R. and Goldsby, K., 2012. <i>Chemistry</i>, 11th edition, McGraw-Hill, USA.</p> <p>3. Goldberg, D. E., 2007. <i>Fundamental of Chemistry</i>, Edisi keempat, McGraw-Hill Companies.</p> <p>Goldberg, D. E., 2007. <i>Fundamental of Chemistry</i>, 4th edition, McGraw-Hill Companies</p>						
Dosen Pengampu <i>Lecturer</i>	Tim dosen Kimia 1 <i>Chemistry 1 Team</i>						
Matakuliah syarat <i>Pre-Requisite Courses</i>	Tidak ada prasyarat <i>No pre-requisite courses</i>						
Mg Ke- Week	Kemampuan akhir tiap tahapan belajar (Sub-CPMK) <i>Sub-Course Learning Outcome</i>	Penilaian <i>Assessment</i>		Bentuk Pembelajaran; <i>Learning Design</i> Metode Pembelajaran; <i>Learning Method</i> Penugasan Mahasiswa; <i>Student Assignment</i> [<i>Estimasi Waktu</i>] [<i>Estimated Time</i>]		Materi Pembelajaran <i>Learning Material</i> [<i>Pustaka</i>] [<i>Reference</i>]	Bobot Penilaian (%) <i>Assessment Composition (%)</i>
		Indikator <i>Indicator</i>	Kriteria & Teknik <i>Criteria and Technique</i>	Tatap Muka (5) <i>Face-to-face Class (5)</i>	Daring (6) <i>Online Class (6)</i>	(7) (7)	(8) (8)
(1) (1)	(2) (2)	(3) (3)	(4) (4)	(5) (5)	(6) (6)	(7) (7)	(8) (8)
1	Mahasiswa mampu menjelaskan prinsip-prinsip dasar kimia, meliputi Konsep Dasar Kimia	<ul style="list-style-type: none"> Ketepatan dalam menjelaskan konsep dasar kimia Ketepatan dalam perhitungan (rumus dan satuan) pada contoh yang relevan 		Kuliah Tatap Muka [TM: 1x(2x50')] [TM: 1x(1x50')] [BM: 1x(3x60')] [PT: 1x(3x60')]		<ul style="list-style-type: none"> Kontrak Kuliah Proses analisis materi (unsur, senyawa, sifat fisika, sifat kimia) Hukum-hukum dasar penggabungan unsur (Proust, Lavoisier, Dalton) 	3

	<p><i>The students should be able to explain the fundamental principles of chemistry, including the basic concepts of chemistry.</i></p>	<ul style="list-style-type: none"> • Accuracy in explaining the basic concepts of chemistry • Accuracy in the calculation (formulas and units) of relevant examples 		<p>Lecture [OM: 1x(2x50')] [OM: 1x(1x50')] [SL: 1x(3x60')] [SA: 1x(3x60')]</p>	<ul style="list-style-type: none"> • Course agreement • Material analysis process (elements, compounds, physical properties, chemical properties) • Laws of chemical combination (Proust, Lavoisier, Dalton) 	
2	<p>Mahasiswa mampu menjelaskan prinsip-prinsip dasar kimia, meliputi Model dan Struktur Atom</p> <p><i>The students should be able to explain the fundamental principles of chemistry, including atom structures and models.</i></p>	<ul style="list-style-type: none"> • Ketepatan dalam menjelaskan konsep • Ketepatan dalam perhitungan • Accuracy in explaining concept of atomic structures • Accuracy in calculation 		<p>Kuliah Tatap Muka [TM: 1x(2x50')] [TM: 1x(1x50')] [BM: 1x(3x60')] [PT: 1x(3x60')]</p> <p>Lecture [OM: 1x(2x50')] [OM: 1x(1x50')] [SL: 1x(3x60')] [SA: 1x(3x60')]</p>	<ul style="list-style-type: none"> • Perkembangan model dan struktur atom • Percobaan-percobaan yang mendasarinya (Dalton, Thompson, Rutherford, Bohr dan Spektrum Atom Hidrogen) • The development of atom structures and model • The underlying experiments (Dalton, Thompson, Rutherford, Bohr and The Atomic Spectrum of Hydrogen) 	4

3	<p>Mahasiswa mampu menjelaskan prinsip-prinsip dasar kimia, meliputi Konfigurasi Elektron</p> <p><i>The students should be able to explain the fundamental principles of chemistry, including electron configurations</i></p>	<p>Ketepatan dalam menjelaskan konsep</p> <p><i>Accuracy in explaining the concepts</i></p>	<p>Teknik: Team base project (non-tes)</p> <p>Technique: Team base project (Non test)</p>	<p>Kuliah Tatap Muka [TM: 1×(2×50')] [TM: 1×(1×50')] [BM: 1×(3×60')] [PT: 1×(3×60')]</p> <p>Lecture [OM: 1×(2×50')] [OM: 1×(1×50')] [SL: 1×(3×60')] [SA: 1×(3×60')]</p>	<ul style="list-style-type: none"> • Konfigurasi elektron suatu unsur dan ion • Sistem Periodik Unsur • Sifat periodisitas unsur • <i>Electron configurations of elements and ions</i> • <i>Periodic system of elements</i> • <i>The periodicity of elements</i> • <i>Ionic bond</i> 	4
4	<p>Mahasiswa mampu menjelaskan prinsip-prinsip dasar kimia, meliputi Konsep Mol, Stoikhiometri dan Sifat Koligatif Larutan</p> <p><i>The students should be able to explain the fundamental principles of chemistry, including chemical solutions, concentrations, and colligative properties</i></p>	<ul style="list-style-type: none"> • Ketepatan perhitungan yang berkaitan dengan konsentrasi larutan, stoikhiometri dan sifat koligatif larutan. <p><i>Accuracy of calculation related to the concentration of a solute, stoichiometry in chemical reactions and colligative properties</i></p>	<p>Teknik: Kuis (Tes)</p> <p>Team base project (non-tes)</p> <p>Technique: Quiz (Test)</p> <p>Team base project (Non test)</p>	<p>Kuliah Tatap Muka [TM: 1×(2×50')] [TM: 1×(1×50')] [BM: 1×(3×60')] [PT: 1×(3×60')]</p> <p>Lecture [OM: 1×(2×50')] [OM: 1×(1×50')] [SL: 1×(3×60')] [SA: 1×(3×60')]</p>	<ul style="list-style-type: none"> • Perhitungan konsep mol • Rumus empiris dan rumus molekul • Satuan Konsentrasi (M, N, %, m, F, ppm, ppb) • Stoikhiometri dalam Larutan • Standarisasi • <i>Mole concept's calculation</i> • <i>Empirical and molecular formula</i> • <i>Concentration</i> 	4

						<ul style="list-style-type: none"> units (M, N, %, m, F, ppm,ppb) Stoichiometry in solution Standarization Colligative properties of a solution 	
5	<p>Mahasiswa mampu menjelaskan prinsip-prinsip dasar kimia, meliputi Ikatan Kimia</p> <p><i>The students should be able to explain the fundamental principles of chemistry, including chemical bonds.</i></p>	<ul style="list-style-type: none"> Ketepatan dalam menjelaskan konsep Ketepatan dalam menjelaskan dan membedakan jenis ikatan kimia <ul style="list-style-type: none"> Accuracy in explaining the concepts of chemical bond Accuracy in explaining the different kind of chemical bonds 	<p>Teknik: Team base project (non-tes)</p> <p>Technique: Team base project (Non test)</p>	<p>Kuliah Tatap Muka</p> <p>[TM: 1x(2x50')] [TM: 1x(1x50')] [BM: 1x(3x60')] [PT: 1x(3x60')]</p> <p>Lecture</p> <p>[OM: 1x(2x50')] [OM: 1x(1x50')] [SL: 1x(3x60')] [SA: 1x(3x60')]</p>		<ul style="list-style-type: none"> Ikatan ionik, Ikatan kovalen dan kovalen polar, momen dipol, ikatan logam, ikatan hidrogen, dan ikatan Van der Walls Struktur dan bentuk geometri molekul (struktur Lewis, dan hibridisasi) Polar covalent and covalent bonds, dipole moment, metal bonds, hydrogen bonds, and Van der Walls bonds Molecular structures and geometrics (Lewis structures and 	4

6	<p>Mahasiswa mampu menjelaskan prinsip-prinsip dasar kimia meliputi Wujud Zat dan Perubahan Fasa</p> <p><i>The students should be able to explain the fundamental principles of chemistry, including the state of matters and phase transformations.</i></p>	<ul style="list-style-type: none"> • Ketepatan dalam menjelaskan konsep • Ketepatan dalam perhitungan • Accuracy in explaining the concepts • Accuracy in the calculation 	<p>Teknik: Team base project (non-tes)</p> <p>Technique: Team base project (Non test)</p>	<p>Kuliah Tatap Muka [TM: 1x(2x50')] [TM: 1x(1x50')] [BM: 1x(3x60')] [PT: 1x(3x60')]</p> <p>Lecture [OM: 1x(2x50')] [OM: 1x(1x50')] [SL: 1x(3x60')] [SA: 1x(3x60')]</p>	<p><i>hybridization</i></p> <ul style="list-style-type: none"> • Wujud Gas (Hukum-hukum gas dan sifat fisiknya) • Wujud Cair (sifat fisik cairan: tekanan uap, titik didih, tegangan permukaan, viskositas), Sifat Koligatif Larutan • Gaseous state (Gas laws and its physical properties) • Liquid state (Liquid physical properties: vapor pressure, boiling point, surface tension, viscosity) 	3
7	<p>Mahasiswa mampu menjelaskan prinsip-prinsip dasar kimia meliputi Wujud Zat dan Perubahan Fasa</p>	<ul style="list-style-type: none"> • Ketepatan dalam menjelaskan konsep • Ketepatan dalam perhitungan 	<p>Teknik: Tugas (non-tes)</p> <p>Team base project (non-tes)</p>	<p>Kuliah Tatap Muka [TM: 1x(2x50')] [TM: 1x(1x50')] [BM: 1x(3x60')] [PT: 1x(3x60')]</p>	<ul style="list-style-type: none"> • Wujud Padat (kisi Kristal, kubus sederhana simple cube, kubus berpusat muka face centered cube, kubus 	3

	<p>The students should be able to explain the fundamental principles of chemistry, including the state of matters and phase transformations.</p>	<ul style="list-style-type: none"> • Accuracy in explaining the concepts • Accuracy in the calculation 	<p>Technique: Assignment (Non test)</p> <p>Team base project (Non test)</p>	<p>Lecture [OM: 1x(2x50')] [OM: 1x(1x50')] [SL: 1x(3x60')] [SA: 1x(3x60')]</p>	<p>berpusat badan body centered cube, indeks Miller, persamaan Bragg)</p> <ul style="list-style-type: none"> • Solid-state (Crystal lattice, simple cube, face-centered cube, body-centered cube, Miller index, Bragg's equation) 	
8	Evaluasi Tengah Semester Mid-Semester Examination					25
9	<p>Mahasiswa mampu menjelaskan prinsip-prinsip dasar kimia, meliputi Keseimbangan Ionik dalam Larutan</p> <p>The students should be able to explain the fundamental principles of chemistry, including ionic equilibrium in substances</p>	<ul style="list-style-type: none"> • Ketepatan dalam konsep • Ketepatan dalam perhitungan <ul style="list-style-type: none"> • Accuracy in explaining the concepts • Accuracy in the calculation 	<p>Teknik: Team base project (non-tes)</p> <p>Technique: Team base project (Non test)</p>	<p>Kuliah Tatap Muka [TM: 1x(2x50')] [TM: 1x(1x50')] [BM: 1x(3x60')] [PT: 1x(3x60')]</p> <p>Lecture [OM: 1x(2x50')] [OM: 1x(1x50')] [SL: 1x(3x60')] [SA: 1x(3x60')]</p>	<ul style="list-style-type: none"> • Teori Asam Basa (Teori Arrhenius, Brønsted-Lowry, Teori Lewis) • Derajat ionisasi dan tetapan ionisasi • Kekuatan Asam Basa • Keseimbangan asam-basa lemah • Acid-base theory (Arrhenius, Bronsted- Lowry theory, Lewis theory) • Degree of ionization and ionization 	4

						<i>constant</i> <ul style="list-style-type: none"> • <i>Acid-base strength</i> • <i>Weak acid-base equilibrium</i> 	
10	<p>Mahasiswa mampu menjelaskan prinsip-prinsip dasar kimia, meliputi Kestimbangan Ionik dalam Larutan</p> <p><i>The students should be able to explain the fundamental principles of chemistry, including ionic equilibrium in substances</i></p>	<ul style="list-style-type: none"> • Ketepatan dalam konsep • Ketepatan dalam perhitungan • <i>Accuracy in explaining the concepts</i> • <i>Accuracy in the calculation</i> 	<p>Teknik: <i>Team base project (non-test)</i></p> <p>Technique: <i>Team base project (test)</i></p>	<p>Kuliah Tatap Muka</p> <p>[TM: 1x(2x50')] [TM: 1x(1x50')] [BM: 1x(3x60')] [PT: 1x(3x60')]</p> <p>Lecture</p> <p>[OM: 1x(2x50')] [OM: 1x(1x50')] [SL: 1x(3x60')] [SA: 1x(3x60')]</p>		<ul style="list-style-type: none"> • Kestimbangan ionik antara zat padat dan larutan • Sistem Buffer • Kelarutan • <i>Ionic equilibrium between solid and liquid</i> • <i>Buffer system</i> • <i>Solubility</i> 	4
11	<p>Mahasiswa mampu menjelaskan prinsip-prinsip dasar ilmu kimia meliputi, Termodinamika Kimia dan Termokimia</p>	<ul style="list-style-type: none"> • Ketepatan dalam konsep • Ketepatan dalam perhitungan 	<p>Teknik: <i>Team base project (non-test)</i></p>	<p>Kuliah Tatap Muka</p> <p>[TM: 1x(2x50')] [TM: 1x(1x50')] [BM: 1x(3x60')] [PT: 1x(3x60')]</p>		<ul style="list-style-type: none"> • Konsep termodinamika (prinsip, keadaan dan proses) • Hukum I Termodinamika: energi dalam, kerja dan kalor • Kapasitas panas, kalorimetri dan entalpi • Hukum II Termodinamika dan spontanitas • Termokimia serta penggunaannya untuk menjelaskan 	4

	<p><i>The students should be able to explain the fundamental principles of chemistry, including chemical thermodynamics and thermochemistry</i></p>	<ul style="list-style-type: none"> • Accuracy in explaining the concepts • Accuracy in calculation 	<p>Technique: Assignment (Non test)</p>	<p>Lecture [OM: 1×(2×50')] [OM: 1×(1×50')] [SL: 1×(3×60')] [SA: 1×(3×60')]</p>	<ul style="list-style-type: none"> • kespontanan reaksi kimia • Perhitungan yang berkaitan dengan aplikasi mesin Carnot • Thermodynamic concepts (principles, states, and processes) • First Law of Thermodynamics: internal energy, work, and heat • Heat capacity, calorimetry, and enthalpy • The second law of thermodynamics and spontaneity • Thermochemistry and its use to explain the spontaneity of chemical reactions <p>Calculations related to the Application of Carnot engine</p>	
12	<p>Mahasiswa mampu menjelaskan prinsip-prinsip</p>	<ul style="list-style-type: none"> • Ketepatan dalam konsep 	<p>Teknik: Team base project (non-test)</p>	<p>Kuliah Tatap Muka [TM: 1×(2×50')]</p>	<ul style="list-style-type: none"> • Konsep Keseimbangan Kimia dan Tetapan 	4

	<p>dasar kimia, meliputi Kestimbangan Kimia</p> <p><i>The students should be able to explain the fundamental principles of chemistry, including chemical equilibrium</i></p>	<ul style="list-style-type: none"> • Ketepatan dalam perhitungan • Accuracy in explaining the concepts • Accuracy in the calculation 		<p>[TM: 1x(1x50')] [BM: 1x(3x60')] [PT: 1x(3x60')]</p> <p>Lecture [OM: 1x(2x50')] [OM: 1x(1x50')] [SL: 1x(3x60')] [SA: 1x(3x60')]</p>		<p>Kestimbangan (Quotient reaksi, tetapan kestimbangan Kp dan Kc)</p> <ul style="list-style-type: none"> • Asas Le Chatelier • Faktor-faktor yang mempengaruhi kestimbangan kimia • Concept of chemical equilibrium and equilibrium constant (Reaction Quotient, the equilibrium constant, Kp and Kc) • Le Chatelier's principles • Factors that affect chemical equilibrium 	
13	<p>Mahasiswa mampu menjelaskan prinsip-prinsip dasar ilmu kimia meliputi Kinetika Kimia</p>	<ul style="list-style-type: none"> • Ketepatan dalam konsep • Ketepatan dalam perhitungan 	<p>Teknik: <i>Team base project</i> (non-test)</p>	<p>Kuliah Tatap Muka [TM: 1x(2x50')] [TM: 1x(1x50')] [BM: 1x(3x60')] [PT: 1x(3x60')]</p>		<ul style="list-style-type: none"> • Konsep kinetika kimia • Laju dalam reaksi kimia • Penentuan laju reaksi, orde dan konstanta laju reaksi 	4

	<i>The students should be able to explain the fundamental principles of chemistry, including chemical kinetics</i>	<ul style="list-style-type: none"> • Accuracy in explaining the concepts • Accuracy in calculation 		<p>Lecture</p> <p>[OM: 1×(2×50')]</p> <p>[OM: 1×(1×50')]</p> <p>[SL: 1×(3×60')]</p> <p>[SA: 1×(3×60')]</p>		<ul style="list-style-type: none"> • Pengaruh suhu pada laju reaksi • Reaksi elementer • Katalis • The concept of chemical kinetics • Rate of chemical reactions • Determination of reaction rates, orders, and rate constants • Effect of temperature on reaction rates • Elementary reactions <p>Catalyst</p>	
14	Mahasiswa mampu menjelaskan prinsip-prinsip dasar ilmu kimia meliputi Elektrokimia	<ul style="list-style-type: none"> • Ketepatan dalam konsep • Ketepatan dalam perhitungan 	<p>Teknik:</p> <p>Team base project (non-test)</p> <p>Kuis (test)</p>	<p>Kuliah Tatap Muka</p> <p>[TM: 1×(2×50')]</p> <p>[TM: 1×(1×50')]</p> <p>[BM: 1×(3×60')]</p> <p>[PT: 1×(3×60')]</p>		<ul style="list-style-type: none"> • Konsep reaksi redoks • Sel elektrokimia (elektroda dan larutan elektrolit dalam sel elektrokimia) • Pengaruh konsentrasi dan persamaan Nerst • Penggunaan konsep 	5

	<p><i>The students should be able to explain the fundamental principles of chemistry, including electrochemistry</i></p>	<ul style="list-style-type: none"> • Accuracy in explaining the concepts • Accuracy in the calculation 	<p>Technique: Quiz (Test)</p>	<p>Lecture [OM: 1×(2×50')] [OM: 1×(1×50')] [SL: 1×(3×60')] [SA: 1×(3×60')]</p>	<p>elektrokimia untuk aplikasi sel volta (baterai dan Fuel Cells) serta elektrolisis</p> <ul style="list-style-type: none"> • Korosi dan pencegahan korosi • The concept of the redox reaction • Electrochemical cells (electrodes and electrolyte solutions in electrochemical cells) • Effect of concentration and Nernst equation • Use of electrochemical concepts for voltaic cell applications (batteries and Fuel Cells) and electrolysis • Corrosion and corrosion prevention 	
15-16	<p>Evaluasi Akhir Semester</p>					25
	<p>Final Semester Examination</p>					

Catatan:

1. **Capaian Pembelajaran Lulusan PRODI (CPL-PRODI)** adalah kemampuan yang dimiliki oleh setiap lulusan PRODI yang merupakan internalisasi dari sikap, penguasaan pengetahuan dan ketrampilan sesuai dengan jenjang prodinya yang diperoleh melalui proses pembelajaran.
2. **CPL yang dibebankan pada mata kuliah** adalah beberapa capaian pembelajaran lulusan program studi (CPL-PRODI) yang digunakan untuk pembentukan/pengembangan sebuah mata kuliah yang terdiri dari aspek sikap, ketrampilan umum, ketrampilan khusus dan pengetahuan.
3. **CP Mata kuliah (CPMK)** adalah kemampuan yang dijabarkan secara spesifik dari CPL yang dibebankan pada mata kuliah, dan bersifat spesifik terhadap bahan kajian atau materi pembelajaran mata kuliah tersebut.
4. **Sub-CP Mata kuliah (Sub-CPMK)** adalah kemampuan yang dijabarkan secara spesifik dari CPMK yang dapat diukur atau diamati dan merupakan kemampuan akhir yang direncanakan pada tiap tahap pembelajaran, dan bersifat spesifik terhadap materi pembelajaran mata kuliah tersebut.
5. **Indikator penilaian** kemampuan dalam proses maupun hasil belajar mahasiswa adalah pernyataan spesifik dan terukur yang mengidentifikasi kemampuan atau kinerja hasil belajar mahasiswa yang disertai bukti-bukti.
6. **Kriteria Penilaian** adalah patokan yang digunakan sebagai ukuran atau tolok ukur ketercapaian pembelajaran dalam penilaian berdasarkan indikator-indikator yang telah ditetapkan. Kriteria penilaian merupakan pedoman bagi penilai agar penilaian konsisten dan tidak bias. Kriteria dapat berupa kuantitatif ataupun kualitatif.
7. **Bentuk penilaian:** tes dan non-tes.
8. **Bentuk pembelajaran:** Kuliah, Responsi, Tutorial, Seminar atau yang setara, Praktikum, Praktik Studio, Praktik Bengkel, Praktik Lapangan, Penelitian, Pengabdian Kepada Masyarakat dan/atau bentuk pembelajaran lain yang setara.
9. **Metode Pembelajaran:** Small Group Discussion, Role-Play and Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, dan metode lainnya yang setara.
10. **Materi Pembelajaran** adalah rincian atau uraian dari bahan kajian yg dapat disajikan dalam bentuk beberapa pokok dan sub-pokok bahasan.
11. **Bobot penilaian** adalah prosentasi penilaian terhadap setiap pencapaian sub-CPMK yang besarnya proposional dengan tingkat kesulitan pencapaian sub-CPMK tsb., dan totalnya 100%.
12. **TM**=Tatap Muka, **PT**=Penugasan terstruktur, **BM**=Belajar mandiri

Note:

1. **Learning Outcomes of Study Program (LO)** is the ability possessed by every graduate of the study program which is the internalization of attitudes, mastery of knowledge and skills in accordance with the level of study program obtained through the learning proces.
2. **PLO Charged to The Course** is some of the learning outcomes of study program graduates (PLO) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Course Learning Outcome (CLO)** is the ability that is described specifically from the PLO that is charged to the course and is specific to the study material or learning material of the course.

4. **Sub-CLO** is the ability that is specifically described from the CLO that can be measured or observed and is the final ability that is planned at each stage of learning and is specific to the learning material of the course.
5. **Indicator** is the ability in the process and student learning outcomes is a specific and measurable statement that identifies the ability or performance of student learning outcomes accompanied by evidence
6. **Criteria** is a benchmark that is used as a measure or benchmark for learning achievement in an assessment based on predetermined indicators. Assessment criteria are guidelines for assessors so that the assessment is consistent and unbiased. Criteria can be either quantitative or qualitative.
7. **Assesment Design:** test and non-test.
8. **Learning Design:** 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 Method:** Small Group Discussion, Role-Play and Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent method.
10. **Learning Material** are details or descriptions of study materials that can be presented in the form of several main points and sub-topics.
11. **Assesment Composition** is the percentage of assessment of each achievement of the sub-CLO which is proportional to the level of difficulty of achieving the sub-CLO, and the total is 100%

OM=Offline Meeting, **SA**=Structured Assesment, **SL**=Self Learning