



CURRICULUM BOOK

2024-2028

Based on The Rector's Decree
No. : /UN11/KPT/2024

**Bachelor in Chemistry
Education Study Program**

**FACULTY OF TEACHER
TRAINING AND EDUCATION**

**CURRICULUM DOCUMENT
CHEMISTRY EDUCATION
STUDY PROGRAM**

(UNDERGRADUATE)

**UNIVERSITAS SYIAH KUALA
FAKULTAS KEGURUAN DAN ILMU PENDIDIKAN
DARUSSALAM 2024**

STUDY PROGRAM IDENTITY

Program Specifications

1	Institution Name	<i>Universitas Syiah Kuala</i>
2	Study Program Name	<i>Chemistry Education</i>
3	Academic Level	<i>Undergraduate (Bachelor's Degree)</i>
4	Program Address	<i>Jl. Tgk. H. Krueng Kalee Darussalam Banda Aceh</i>
5	Accreditation Status and Accrediting Body (e.g., BAN-PT, LAM, International Agency)	<i>Excellent (BAN-PT)</i>
6	Degree Awarded	<i>Bachelor of Education (B.Ed.)</i>
7	Duration of Study and Credits in ECTS	-

PROFILE OF THE CHEMISTRY EDUCATION STUDY PROGRAM

The Chemistry Education Study Program (CESP) at Universitas Syiah Kuala (USK) was established in July 1984 under Decree No. 59/DIKTI/Kop/1984 and Operational Permit No. 8771/D/T/K-N/2011. Since 2023, CESP has been accredited with "Excellent" based on Decree No. 1147/SK/BAN-PT/Ak-PPJ/S/III/2023. The scientific vision of CESP is: To deliver innovative, independent, and leading education and teaching that produces chemistry education graduates with a socio-technopreneurial spirit who are competitive at both national and CPLbal levels.

CESP currently has 19 permanent lecturers and 6 additional lecturers from outside the program. Among them, there are 2 professors, 6 PhD holders, and 11 Master's degree holders specializing in fields such as Chemistry Education, Analytical Chemistry, Organic Chemistry, Inorganic Chemistry, Physical Chemistry, Biochemistry, Environmental Chemistry, General Education, and Educational Sciences. External lecturers are responsible for teaching mathematics and educational theory courses. CESP is also supported by 2 administrative staff and 1 laboratory technician.

CESP USK demonstrates excellence in producing internationally reputable publications not only in chemistry education but also in pure and applied chemistry. Similarly, its graduates are equipped to pursue careers not only in science education but also in pure and applied chemistry. This is evidenced by the 2023 tracer study of the 2022 graduates: of the 36 alumni currently employed, 17 work in government institutions, 9 in private institutions, 4 are self-employed or run their own businesses, 2 work in non profit/NGOs, 1 in a multilateral organization, and 2 in other sectors. This indicates that CESP graduates are capable of fulfilling roles as Educators, Junior Researchers, Education Managers, and Multidisciplinary Creative Workers, which aligns with the program's graduate profiles.

CURRICULUM DEVELOPMENT TEAM DECREE
(Curriculum Development Team Appointment Decree for the Study Program)



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KEPUTUSAN REKTOR UNIVERSITAS SYIAH KUALA

NOMOR 1354/UN11/KPT/2024

TENTANG

**PENUNJUKAN TIM REVISI KURIKULUM BERBASIS OBE PROGRAM STUDI
PENDIDIKAN KIMIA FAKULTAS KEGURUAN DAN ILMU PENDIDIKAN
UNIVERSITAS SYIAH KUALA**

REKTOR UNIVERSITAS SYIAH KUALA,

- Membaca :** Surat Dekan Fakultas Keguruan dan Ilmu Pendidikan Universitas Syiah Kuala Nomor 1562/UN11.1.6/HK.00.02/2024 tanggal 22 Februari 2024, perihal usulan keputusan Rektor Universitas Syiah Kuala.
- Menimbang :**
- a. bahwa untuk kelancaran pelaksanaan kegiatan revisi kurikulum berbasis OBE pada Program Studi Pendidikan Kimia Fakultas Keguruan dan Ilmu Pendidikan Universitas Syiah Kuala, maka perlu ditunjuk Tim yang bertugas untuk itu;
 - b. bahwa untuk keperluan dimaksud, perlu ditetapkan dengan Keputusan Rektor;
- Mengingat :**
1. Undang-Undang Nomor 17 Tahun 2003 tentang Keuangan Negara;
 2. Undang-Undang Nomor 1 Tahun 2004 tentang Perbendaharaan Negara;
 3. Undang-Undang Nomor 12 Tahun 2012 tentang Pendidikan Tinggi;
 4. Undang-Undang Nomor 19 Tahun 2023 tentang Anggaran Pendapatan dan Belanja Negara Tahun Anggaran 2024;
 5. Peraturan Pemerintah Nomor 4 Tahun 2014 tentang Penyelenggaraan Pendidikan Tinggi dan Pengelolaan Perguruan Tinggi;
 6. Peraturan Pemerintah Nomor 38 Tahun 2022 tentang Perguruan Tinggi Negeri Badan Hukum Universitas Syiah Kuala;
 7. Peraturan Menteri Keuangan Nomor 49 Tahun 2023 tentang Standar Biaya Masukan Tahun Anggaran 2024;
 8. Keputusan Menteri Pendidikan, Kebudayaan, Riset dan Teknologi Nomor 11837/MPK.A/KP.07.00/2022 tentang Pengangkatan Rektor Universitas Syiah Kuala Periode Tahun 2022-2026;
 9. Peraturan Rektor Nomor 5 Tahun 2024 tentang Organisasi dan Tata Kerja Unsur Rektor Universitas Syiah Kuala;

MEMUTUSKAN:

- Menetapkan :** KEPUTUSAN REKTOR TENTANG PENUNJUKAN TIM REVISI KURIKULUM BERBASIS OBE PROGRAM STUDI PENDIDIKAN KIMIA FAKULTAS KEGURUAN DAN ILMU PENDIDIKAN UNIVERSITAS SYIAH KUALA.

- KESATU : Menunjuk Saudara-saudara yang namanya tercantum dalam daftar lampiran keputusan ini sebagai Tim Revisi Kurikulum Berbasis OBE Program Studi Pendidikan Kimia Fakultas Keguruan dan Ilmu Pendidikan Universitas Syiah Kuala.
- KEDUA : Segala biaya yang diakibatkan oleh keluarnya Keputusan ini dibebankan pada Anggaran PTNBH Universitas Syiah Kuala Tahun Anggaran 2024 yang sesuai dengan Peraturan Keuangan.
- KETIGA : Keputusan Rektor ini berlaku pada tanggal ditetapkan dan apabila dalam penetapan ini kemudian ternyata terdapat kekeliruan akan diperbaiki kembali sebagaimana mestinya.

Ditetapkan di Banda Aceh
pada tanggal 21 Maret 2024

REKTOR UNIVERSITAS SYIAH KUALA,



Prof. Dr. Ir. MARWAN
NIP 196612241992031003

LAMPIRAN
KEPUTUSAN REKTOR UNIVERSITAS SYIAH KUALA
NOMOR 1354/UN11/KPT/2024, TANGGAL 21 MARET 2024
TENTANG
PENUNJUKAN TIM REVISI KURIKULUM BERBASIS OBE PROGRAM STUDI
PENDIDIKAN KIMIA FAKULTAS KEGURUAN DAN ILMU PENDIDIKAN
UNIVERSITAS SYIAH KUALA

No	Nama/NIP/NIPK	Pangkat/Gol	Jabatan dalam Dinas	Jabatan dalam Panitia	Rincian Tugas	Tugas dan Fungsi
1	Dr. Sanusi, S.Pd., M.Si 197304141998021001	Pembina (Gol. IV/a)	Wakil Dekan Akademik Fakultas Keguruan dan Ilmu Pendidikan	Pengarah	Mengendalikan Tim dan melakukan komunikasi dengan institusi terkait atau pimpinan	Ya
2	Dr. Drs. Syahrial, M.Si 196712281993031003	Pembina Tk. I (Gol. IV/b)	Ketua Jurusan Pendidikan Kimia	Penanggung Jawab	Bertanggung jawab dalam tim secara keseluruhan	Ya
3	Ratu Fazlia Inda Rahmayani, S.Pd., M.Sc. 198909272015042003	Penata Tk. I (Gol. III/d)	Lektor	Ketua	Mengevaluasi dan mengkoordinir tim penyusun revisi kurikulum berbasis OBE	Tidak
4	Kana Puspita, S.Pd., M.Si.P 199312232019032019	Penata (Gol. III/c)	Lektor	Sekretaris	Membantu ketua mengevaluasi dan mengkoordinir tim penyusun revisi kurikulum berbasis OBE	Tidak
5	Prof. Dr. M. Hasan, M.Si. 196812311993031018	Pembina Utama Madya (Gol. IV/d)	Guru Besar	Anggota	Membantu menyusun revisi kurikulum berbasis OBE sesuai MK yang diampu	Tidak
6	Drs. Rusman, M.Si 196509061993031006	Pembina (Gol. IV/a)	Lektor Kepala	Anggota	Membantu menyusun revisi kurikulum berbasis OBE sesuai MK yang diampu	Tidak
7	Dr. Abdul Gani, M.Si 196612051991031003	Pembina Utama Muda (Gol. IV/c)	Lektor Kepala	Anggota	Membantu menyusun revisi kurikulum berbasis OBE sesuai MK yang diampu	Tidak
8	Prof. Dr. Adlim, M.Sc 196512041990031004	Pembina Utama (Gol. IV/e)	Guru Besar	Anggota	Membantu menyusun revisi kurikulum berbasis OBE sesuai MK yang diampu	Tidak
9	Dra. Erliawati, M.Si 196508281991032003	Pembina Tk. I (Gol. IV/b)	Lektor Kepala	Anggota	Membantu menyusun revisi kurikulum berbasis OBE sesuai MK yang diampu	Tidak
10	Dra. Latifah Hanum, M.Si. 196801011994032002	Penata Tk. I (Gol. III/d)	Lektor	Anggota	Membantu menyusun revisi kurikulum berbasis OBE sesuai MK yang diampu	Tidak
11	Dr. Ibnu Khaldun, M.Si 196610101991021003	Pembina Utama Muda (Gol. IV/c)	Lektor Kepala	Anggota	Membantu menyusun revisi kurikulum berbasis OBE sesuai MK yang diampu	Tidak
12	Dr. Dra. Sulastri, M.Si 196808111992032001	Penata Tk. I (Gol. III/d)	Wakil Ketua bidang pengabdian	Anggota	Membantu menyusun revisi kurikulum berbasis OBE sesuai MK yang diampu	Tidak
13	Drs. Zulfadli, M.Si 196605021992031003	Pembina (Gol. IV/a)	Lektor Kepala	Anggota	Membantu menyusun revisi kurikulum berbasis OBE sesuai MK yang diampu	Tidak
14	Drs. M. Nasir, M.Si 196402011990031002	Pembina Utama Muda (Gol. IV/c)	Lektor Kepala	Anggota	Membantu menyusun revisi kurikulum berbasis OBE sesuai MK yang diampu	Tidak
15	Dr. Sri Winarni, S.Pd., M.Pd. 197910162008122003	Penata (Gol. III/c)	Lektor	Anggota	Membantu menyusun revisi kurikulum berbasis OBE sesuai MK yang diampu	Tidak
16	Habibati, S.Pd, M.Sc. 198111022005012003	Penata Tk. I (Gol. III/d)	Lektor	Anggota	Membantu menyusun revisi kurikulum berbasis OBE sesuai MK yang diampu	Tidak
17	Muhammad Nazar, S.Pd., M. SCST. 197906112006041002	Pembina (Gol. IV/a)	Sekretaris Jurusan Pendidikan Kimia	Anggota	Membantu menyusun revisi kurikulum berbasis OBE sesuai MK yang diampu	Tidak

No	Nama/NIP/NIPK	Pangkat/Gol	Jabatan dalam Dinas	Jabatan dalam Panitia	Rincian Tugas	Tugas dan Fungsi
18	Dr. Rahmad Rizki Fazli, S.Pd., M.Si. 199310112022031012	Penata Muda Tk. I (Gol. III/b)	Asisten Ahli	Anggota	Membantu menyusun revisi kurikulum berbasis OBE sesuai MK yang diampu	Tidak

Ditetapkan di Banda Aceh
pada tanggal 21 Maret 2024

REKTOR UNIVERSITAS SYIAH KUALA,



Prof. Dr. Ir. MARWAN
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PREFACE

The 2024 Universitas Syiah Kuala (USK) curriculum has been aligned with developments in the Industrial Revolution 4.0, the "Kampus Merdeka" policy, the Ministry of Education, Culture, Research, and Technology Regulation No. 53 of 2023, and the university's new status as a Legal Entity State University (Perguruan Tinggi Negeri Berbadan Hukum/PTNBH). In line with these changes, it is essential for the Chemistry Education Study Program (CESP) to revise its curriculum to stay aligned with the institutional curriculum.

The CESP Curriculum Book for the 2024–2029 period consists of four chapters. Chapter 1 outlines the curriculum development process, including an evaluation of the previous curriculum, tracer studies, and the theoretical framework for curriculum design and development. Chapter 2 presents the scientific vision, mission, goals, and strategies of CESP. Chapter 3 details the graduate profile and the formulation of learning outcomes. Chapter 4 contains the evaluation plan for CESP's learning program.

This curriculum was developed with the active participation of CESP faculty members, alumni, and stakeholders. We express our sincere gratitude to all who contributed their time and ideas, especially the Curriculum Development Team. We hope this curriculum serves as a valuable guide for implementing the CESP program at the Faculty of Teacher Training and Education (Fakultas Keguruan dan Ilmu Pendidikan/FKIP), USK, in producing graduates who are competitive on a CPLbal scale.

Dean of the Faculty of Teacher Training and Education, USK

Dr. Drs. Syamsulrizal, M.Kes.

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CHAPTER 1

INTRODUCTION

1.1. Curriculum Document Development Process

Universitas Syiah Kuala (USK) has held the status of a Legal Entity State University (Perguruan Tinggi Negeri Berbadan Hukum/PTNBH) since 2022, in accordance with Government Regulation Number 38 of 2022. With this status, USK is targeting its transformation into a World Class University (WCU). To achieve WCU status, the university's curriculum must be equivalent to that of other world-class institutions. In this context, and in line with the Regulation of the Minister of Education, Culture, Research, and Technology Number 53 of 2023 concerning Quality Assurance in Higher Education, it is necessary to revise the curriculum based on Outcome-Based Education (OBE). The OBE model requires that what is planned in the Semester Learning Plan (SLP) must be measurable, and that the extent to which graduate profiles are achieved through learning activities must be demonstrable.

In general, the curriculum document development process consists of three stages: (1) curriculum design, (2) learning design, and (3) learning program evaluation, as outlined in the *Curriculum Development Guide for Higher Education in the Era of Industry 4.0* issued by the Directorate General of Higher Education and the *USK Curriculum Development Guide 2024–2028*. The implementation of OBE is carried out by integrating several processes, including curriculum design, the formulation of learning outcomes, SLP design, and assessment procedures.

The initial stage of curriculum design begins with the formulation of the Graduate Profile and the Chemistry Education Study Program Learning Outcomes (PLO), taking into account the minimum criteria specified in the Regulation of the Minister of Education, Culture, Research, and Technology Number 53 of 2023 (SN-DIKTI 2023). The graduate profile is determined in line with the expectations of the government, the needs of industry and business (DUDI), and the demands of scientific and technological development. In order for CESP graduates to carry out the roles outlined in the graduate profile, they must possess competencies expressed through the PLO. These competencies must cover four aspects: attitude, knowledge, general skills, and specific skills as stated in the National Higher Education Standards (SN-Dikti). The PLO is formulated by taking into consideration competency levels across three learning domains: cognitive, affective, and psychomotor. Additionally, the PLO is integrated with competencies relevant to the Industrial Revolution 4.0 and the Sustainable Development Goals (SDGs).

The development of courses in CESP is conducted in two stages: (1) selecting several PLO items that are appropriate to serve as the foundation for course development. Each course must include elements of knowledge, skills, and attitude. (2) Simultaneously, the subject matter contained in the selected PLO items is identified and elaborated into course content.

1.2. Curriculum Evaluation and Tracer Study

A. Curriculum Implementation Evaluation

CESP routinely conducts evaluations of curriculum implementation through PLO surveys among students, user satisfaction surveys, and tracer studies. The development of the undergraduate curriculum for CESP involves the full participation of lecturers, alumni, and stakeholders, with data collected through the distribution of Google Forms. The collected responses are compiled, analyzed, and discussed, and the results are used as input and consideration for the study program in formulating the graduate profile and learning outcomes. Input from the 2021 Focus Group Discussion (FGD) of the Association of Chemistry Education Programs in Indonesia was also considered. CESP also participated in a workshop on OBE-based curriculum development held on 21 February 2024 at FKIP USK, facilitated by resource persons from the USK Institute for Quality Assurance (Lembaga Penjaminan Mutu/LPM), namely Prof. Dr. Ir. Suhendrayatna, M.Eng., and Dr. Andi Ulfa Tenri Pada, M.Pd.

The results of the 2023 user satisfaction survey for CESP FKIP USK graduates generally indicate that the program is rated between "very good" and "good." However, there were some users who rated certain competencies as "fair" or "poor." In terms of foreign language (English) proficiency, 47.4% of users rated graduates as "fairly good," with suggestions for improvement. Meanwhile, some users rated graduate adaptability as "poor" (5.3%), indicating the need for further development in this area. The 2021 tracer study also shows that graduate competencies, in general, meet the minimum requirements of industry and business sectors. Alumni have also provided input, particularly emphasizing the need to improve English proficiency and the ability to write scientific papers.

B. Basis for Curriculum Changes

The results of the needs analysis and its relevance for application in CESP are presented in the following table:

Table 1.1 Level of Compatibility of Input with Implementation in CESP

No	Input	Compatibility Level for Implementation in CESP			Suggested Modification if Accepted
		Not Suitable	Suitable	Highly Suitable	
	From Graduate Users				
1	English language proficiency needs improvement			√	
2	Adaptability to the work environment needs improvement			√	

No	Input	Compatibility Level for Implementation in CESP			Suggested Modification if Accepted
		Not Suitable	Suitable	Highly Suitable	
	Alumni CESP				
3	English language proficiency needs improvement			√	
4	Competence in academic writing needs improvement			√	publication of scientific work in nationally accredited journals
	From Program Study Association				
5	Graduate profile as Educator			√	
6	Graduate profile as Researcher			√	
7	Graduate profile as Education Manager			√	
8	Graduate profile as Entrepreneur			√	

C. Summary of Curriculum Changes

The following aspects of the previous curriculum have been revised:

1. Scientific Vision, Mission, and Objectives of CESP
2. Graduate Profile and PLO
3. Several courses have had changes in credit weight (SKS), new courses have been added, and some course names have been changed
4. Course code changes

1.3. Legal Foundations of Curriculum Design and Development

1. Regulation of the Minister of Education, Culture, Research, and Technology No. 53 of 2023 on Quality Assurance in Higher Education
2. Regulation of the Minister of Education and Culture No. 3 of 2020 concerning the National Standards for Higher Education, as well as portions reproduced from the Curriculum Development Guide for Higher Education in the Era of the Industrial Revolution 4.0, published by the Directorate General of Learning and Student Affairs, Ministry of Education and Culture, Research, and Technology in 2020
3. Universitas Syiah Kuala Curriculum Development Guidelines (2023)
4. Other legal frameworks

CHAPTER 2

SCIENTIFIC VISION, GOALS, AND STRATEGIES OF THE STUDY PROGRAM

2.1 Scientific Vision and Mission of the Study Program

2.1.1 Scientific Vision

Table 2.1 Comparison of the Vision Statements of the Study Program, Faculty, and Universitas Syiah Kuala

Study Program's Scientific Vision	Faculty of Teacher Training and Education Vision	Universitas Syiah Kuala Vision
To provide innovative, independent, and leading education and teaching to produce chemistry education graduates with a socio-technopreneurial spirit, capable of competing at national and CPLbal levels.	To become a socio-edupreneurial faculty that is innovative, independent, and leading in producing graduates who excel nationally and CPLbally.	To become an innovative, independent, and leading socio-technopreneurial university at the CPLbal level.

Table 2.2 Checklist of Vision Alignment between USK/Faculty and the Study Program

Scientific Vision Keywords (Study Program)	Alignment with Vision of (give a √ mark)		Alignment Confirmed
	Faculty Vision Keywords	USK Vision Keywords	
Innovative	Innovative	Innovative	√
Independent	Independent	Independent	√
Leading	Leading	Leading	√
<i>Socio-technopreneur</i>	<i>Socio-edupreneur</i>	<i>Socio-technopreneur</i>	√
National and CPLbal	CPLbal	CPLbal	√

2.1.2 Mission of the Study Program

The missions of the CESP, FKIP, USK are:

- 1) To implement innovative **Tri Dharma of Higher Education** activities (education, research, and community service) at the undergraduate level to produce independent, leading chemistry education graduates with a socio-technoedupreneurial spirit, capable of competing nationally and CPLbally.
- 2) To establish and strengthen partnerships with institutions at the national and CPLbal levels to improve the quality of Tri Dharma implementation.

Goals

To produce graduates who possess the qualifications required to serve as educators, researchers, education administrators, and creative professionals across interdisciplinary fields.

2.2 Strategy

The strategies undertaken by CESP to achieve its goals are presented in the following table:

Table 2.3 Strategies Adopted by CESP to Achieve Its Goals

Activity to Achieve Goals	Semester
As a Chemistry Teacher Through coursework in chemistry and education-related courses such as Teaching and Learning Strategies (SBM), Chemistry Learning Planning, Evaluation of Learning, Microteaching, and Teaching Practicum (PPL).	1-7
As a Researcher Through coursework in education and chemistry, as well as Laboratory Practicum, Research Methodology, Chemistry Seminar, Statistics, and Undergraduate Thesis (Skripsi).	1- 8
As an Education Manager Through courses in Educational Management and Laboratory Management.	1- 6
As a Cross-disciplinary Creative Worker Through courses such as Instructional Media, STEAMC (Science, Technology, Engineering, Arts, Mathematics, and Chemistry), Food Chemistry, Chemical Entrepreneurship, Applied Chemistry, Computer Applications, Forensic Chemistry, and ICT in Chemistry Education.	1-7

2.3 University Values

The values embraced by Universitas Syiah Kuala (USK) are rooted in the university's core principles: Pancasila, Sincerity, Honesty, and Solidarity, as stated in Article 7 of Government Regulation No. 38 of 2022.

CHAPTER 3

GRADUATE PROFILE AND FORMULATION OF LEARNING OUTCOMES STANDARDS

3.1 Graduate Profile and Profile Description

Table 3.1 Graduate Profile Descriptions

Code	Graduate Profile	Competencies	Profession
GP-01	A graduate of Chemistry Education with the ability to plan, implement, evaluate, and reflect on learning, and possessing strong social interaction skills to effectively conduct chemistry instruction in schools.	KK + P + S	Educator Profession (GP-01; GP-02; GP-03)
GP-02	A graduate capable of applying scientific problem-solving skills through research in education, science, and/or chemistry.	KU + P + S	Junior Researcher Profession (GP-01; GP-02; GP-03)
GP-03	A graduate with managerial and communication skills to manage education through cross-disciplinary collaboration, emphasizing professional ethics and noble character.	KU + S	Education Manager Profession (GP-01; GP-02; GP-03)
GP-04	A graduate with competencies as a socio-technopreneur, capable of pursuing independent ventures using critical, creative, and adaptive thinking skills.	KU + S	Cross-disciplinary Creative Worker Profession (GP-01; GP-02; GP-04)

Note: KK = Specific Skills; KU = General Skills; P = Knowledge; S = Attitude

3.2 Elements of Intended Learning Outcomes (CPL)

Table 3.2 Correlation Between GP and CPL

PL Code	CPL Code	CPL Description
S + P + KK + KU	CPL-01	Demonstrate responsible and ethical behavior in the learning process by adopting positive habits aligned with scientific principles and societal norms, fostering effective self-management and social skills.
P + KU	CPL-02	Demonstrate the ability to analyze and apply pedagogical theories and concepts supported by TPACK in chemistry education to provide engaging and meaningful learning experiences for students.

PL Code	CPL Code	CPL Description
P + KK	CPL-03	Proficient in implementing chemical concepts, principles, and laws within chemistry education through innovative pedagogical methods and approaches to foster logical reasoning and meaningful learning experiences that are contextually relevant to everyday life.
P + KK	CPL-04	Capable of conducting chemistry teaching process at secondary schools by utilizing diverse resources and media relevant to advancements in science and technology.
P + KK	CPL-05	Proficient in solving problems by applying appropriate methodologies to produce research and publications in the fields of chemistry and chemistry education.
KK + P + S	CPL-06	Demonstrate the ability to perform chemical practices and handle chemicals carefully and accurately by applying proper laboratory procedures to support experiment-based learning.
KU + P	CPL-07	Capable of designing a simple and creative business plan in the field of chemistry or across disciplines to support entrepreneurial initiatives.

3.3 Determination of Subject Matter

Table 3.3 Relationship Between CPL and Subject Matter

CPL Code	Code	Subject Matter
CPL-01	SM-01	Religion, Character, Pancasila, Civics
CPL-02	SM-02	Pedagogical Theory and Concepts, Instructional Media, ICT in Chemistry Education, Computer Applications
CPL-03	SM-03	Chemical Theories, Concepts, Principles, Laws, and Processes
CPL-04	SM-04	Instructional Planning, Teaching and Learning Strategies
CPL-05	SM-05	Research Methodology, Seminars, Research Projects, Thesis, and Educational/Scientific Publications
CPL-06	SM-06	Laboratory Practicum, Research, Laboratory Management
CPL-07	SM-07	Chemical Entrepreneurship, STEAMC (Science, Tech, Engineering, Arts, Math, and Chemistry)

Note: SM = Subject Matter

3.3 Formulation of Course Learning Outcomes (CPMK)

The Intended Learning Outcomes (CPL) are formulated in a general form; therefore, it is necessary to derive more specific outcomes for each course, referred to as Course Learning Outcomes (CPMK). The CPMK must contain components of

competencies and learning materials whose depth and breadth are determined based on the CPL associated with the respective course. The CPMK represents the final competency to be achieved at the end of each learning stage, is specific and measurable, and can be demonstrated by students at the conclusion of the learning process.

The CPMK formulations are expected to cumulatively contribute to the attainment of the CPL. The CPL of the CESP are designed using the SMART principle—Specific, Measurable, Achievable, Realistic, and Time-bound. Meanwhile, the CPMKs are formulated based on the ABCD principle—Audience, Behavior, Condition, and Degree. Once the CPMK has been established, it will then be used as a foundation to determine assessment indicators, criteria, and instruments; to select appropriate forms and learning methods; and to develop the course learning materials. All of these components are compiled into a Semester Learning Plan (SLP) for the course.

3.4 Course Development

The mechanism for course development is divided into two main activities. First, several relevant CPL items are selected as the foundation for course development. Each course must incorporate elements of knowledge, skills, and attitudes. Second, simultaneously, the subject matter embedded within those CPL items is identified and further elaborated into the course content.

The credit weight (SKS) of each course is determined based on several considerations, including: (1) the amount of time required to achieve each CPL item assigned to the course; (2) the form and method of learning chosen; (3) the availability of learning media, resources, facilities, and infrastructure; and (4) the necessity to define subject matter, as well as the scope and depth of the course content, in the course development process itself.

Table 3.4 Example of Credit (SKS) Allocation for Courses

Code	Course Name	Number of CPMKs	Estimated Student Workload Time		SKS
			Theory	Practicum	
SEDC1001	Basic Chemistry I	3	8.5 hours/week for 16 weeks = 134.4 hours	0	3
FEDU1001	Fundamental of education	2	5.67 hours/week for 16 weeks = 89.3 hours	0	2
SEDC1008	Basic Chemistry Practicum I	2	0	2.83 hours/week for 16 weeks = 44.8 hours	1

Note: SKS = Indonesian Credit System

Table 3.5 Relationship between CPMK and Courses

CPMK Code	CPMK Description	Course Code	Course Name
LOID01	Able to explain the essence, position, function, and language attitudes in Indonesian	MKWU1003	INDONESIAN LANGUAGE
LOID02	Able to use spelling, diction, affixation, reduplication, and composition in written Indonesian		
LOID03	Able to use sentence elements correctly and appropriately		
LOID04	Able to write and develop paragraphs in Indonesian		
LOID05	Able to write scientific papers and technical reports, including various types of technical reports in Indonesian		
LOID06	Able to use proper Indonesian in writing official correspondence		
LOKL01	Demonstrates positive behavior related to disaster risk reduction and environmental preservation within course contexts	MKWU1005	DISASTER AND ENVIRONMENTAL STUDIES
LOKL02	Able to make appropriate decisions based on the analysis of information and data to solve problems within their area of expertise, integrated into course learning		

CPMK Code	CPMK Description	Course Code	Course Name
LOKL03	Able to design a simple contingency plan as a crucial step in disaster preparedness, applied within the context of the course		
LOKL04	Able to design a simple project aimed at preventing environmental degradation and promoting environmental sustainability, integrated into the course content		
LOLP01	After actively participating in the course, students are able to understand human nature and dimensions, educational foundations, objectives and principles, education system development, and both formal and non-formal learning, and are skilled in applying these concepts in lesson planning appropriately and responsibly	FEDU1001	FUNDAMENTAL OF EDUCATION
LOLP02	Through discussions, question-and-answer sessions, and problem analysis, students develop the skills to understand learners in managing the classroom learning process appropriately, rationally, and responsibly		
LOKD11	Through discussion and Q&A, students are able to analyze and solve problems related to topics including conversion factors, significant figures in measurements, precision and accuracy; matter and its classification and phases; submicroscopic views of elements, compounds, and mixtures; material changes and indicators; intensive and extensive properties; atomic theory including Dalton's model; periodic system history and utility; atomic structure and electron configuration accurately and responsibly	SEDC1001	BASIC CHEMISTRY I
LOKD12	Through discussions and question-and-answer sessions, students are able to analyze and solve problems related to the following topics: Lewis structures; chemical bonding (introduction); bond polarity; balancing chemical equations; nomenclature of inorganic compounds; fundamental laws of chemistry and their applications; the concept of molecular formulas and structural formulas; writing structural formulas; limiting reagents; oxidation numbers and their rules (for inorganic and organic compounds); the development of redox reactions; and the accurate and responsible balancing of redox reactions		
LOKD13	Through discussions and question-and-answer sessions, students are able to analyze and solve problems related to the following topics: solutions, their processes and properties; solubility; factors affecting solubility; unsaturated, saturated, and supersaturated solutions; as well as carbon, organic, and inorganic compounds; the properties of carbon, organic, and inorganic compounds; reactions occurring in carbon and organic compounds; and the distinctive characteristics of reactions in carbon and organic compounds accurately and responsibly		
LOPK11	Through laboratory activities, students are able to implement basic laboratory safety regulations; utilize important lab instruments and general chemicals; and demonstrate fundamental laboratory skills accurately and responsibly	SEDC1003	BASIC CHEMISTRY PRACTICUM I
LOPK12	Through laboratory activities, students are skilled in demonstrating: separation techniques (sublimation, filtration, recrystallization, distillation, decantation, and centrifugation); chemical reactions; electrolyte		

CPMK Code	CPMK Description	Course Code	Course Name
	and non-electrolyte solutions; and the number of moles involved in a chemical reaction accurately and responsibly		
LOPK21	Through laboratory activities, students are skilled in demonstrating: the factors that affect reaction rates; the rate of metal corrosion both indoors and outdoors and investigating the factors influencing corrosion; as well as acid-base indicators, including both natural and synthetic indicators, in acidic and basic solutions accurately and responsibly	SEDC1004	BASIC CHEMISTRY PRACTICUM II
LOPK22	Through laboratory activities, students are skilled in demonstrating: the concept of colloidal systems in everyday life, the solubility differences of slightly soluble salts in water, and the effect of common ion addition on solubility		
LOAK01	Through the use of technology (C), students (A) are able to utilize office applications to complete academic assignments and enhance digital skills in the chemistry learning process (B) optimally (D)	SEDC1007	COMPUTER APPLICATION
LOAK02	Upon completing the course, students are able to design simple applications using Microsoft Excel actively and innovatively		
LOTB01	Upon completing the course, students are able to plan learning activities based on behavioral, cognitive, constructivist, and social learning theories	SEDC6051	TEACHING AND LEARNING THEORIES IN CHEMISTRY
LOTB02	After understanding behavioral, cognitive, constructivist, and social learning theories, students are able to develop STEAM-C-based instructional tools with an Islamic perspective accurately and measurably		
LOTB03	After completing the course and examining reliable sources independently or in groups, as well as through case studies and/or project-based learning, students are able to accurately identify learning theories in instructional tools and/or teaching practices implemented by teachers		
LOMAT1	Through various learning models, students are able to analyze mathematical concepts, theories, and laws required for chemical calculations in stoichiometry, solution pH, chemical kinetics, solubility product (K _{sp}), quantitative analysis, and quantum chemistry	SEDC1011	MATHEMATICS FOR CHEMISTRY
LOMAT2	Through diverse learning models and problem-solving methods, students are able to apply mathematical concepts, theories, and laws to solve chemical problems related to stoichiometry, solution pH, chemical kinetics, solubility product (K _{sp}), and quantitative chemical analysis		
LOST01	Through the analysis of atomic theory and the application of fundamental chemical laws in laboratory and research activities (C), students (A) are able to apply the mole concept and calculate the concentration of substances in known chemical compounds (B) independently (D)	SEDC1005	STOICHIOMETRY
LOST02	Through innovative course delivery and diverse teaching methods, students are able to accurately compare the number of moles with the coefficients in chemical equations and determine the amount of substances required in chemical processes based on the mole concept precisely and carefully		

CPMK Code	CPMK Description	Course Code	Course Name
LOST03	Through case studies, students are able to calculate the nutrient content needed by plants through fertilization and determine CO ₂ production from the combustion of hydrocarbon compounds, while demonstrating environmental awareness using appropriate methods		
LOKW01	Utilizing learning resources and ICT-based instructional media to search for data/information in order to identify and solve problems related to nationality and citizenship	MKWU1002	CIVICS EDUCATION
LOKW02	Identifying theoretical concepts of citizenship in the context of nationhood and statehood		
LOKW03	Demonstrating patterns of thinking, attitudes, and actions that reflect self-confidence and foster pride as Indonesian citizens and as part of the Indonesian nation, along with a love for the homeland		
LOKW04	Demonstrating responsible attitudes and behaviors that reflect the qualities of a good citizen in social, national, and state life		
LOKW05	Able to exercise the rights and responsibilities of a citizen		
LOAG01	Making decisions based on theoretical concepts of Civic Education to address relevant societal, national, and state issues		
LOAG02	Analyzing the scope and identifying the creation of humans and the universe according to Islam and science	MKWU2001	RELIGIOUS STUDIES
LOAG03	Explaining the essence of human relations with Allah, with fellow humans, and with the natural environment within the Qur'anic paradigm		
LOAG04	Presenting conceptual and/or empirical reviews on the essence and urgency of Islamic spiritual values as one of the determinants in building a character-based nation		
LOAG05	Demonstrating consistent attitudes regarding the coherence of the core teachings of Islam as the implementation of Iman (faith), Islam (practice), and Ihsan (excellence)		
LOAG06	Internalizing the principle of <i>istiqamah</i> (steadfastness) in the application of daily knowledge		
LOPC01	Able to explain the process of the emergence of the Pancasila ideology	MKWU1001	PANCASILA
LOPC02	Able to explain the position of Pancasila as the nation's philosophical foundation and paradigm		
LOPC03	Able to explain Pancasila as the foundation and ideology of the state (in opposition to radicalism and terrorism)		
LOPC04	Able to explain Pancasila as philosophy and ethics in the development of science		
LOFP01	Through discussions and question-and-answer sessions (C), students (A) are able to explain the meaning of philosophy, the relationship between philosophy and education, the meaning of philosophy of education, and the benefits of studying philosophy for educators (B) accurately and rationally (D)	FEDU2003	PHILOSOPHY OF EDUCATION
LOFP02	Through discussions and question-and-answer sessions (C), students (A) are able to explain schools of philosophy and their implications for education, educational philosophy schools, Pancasila philosophy,		

CPMK Code	CPMK Description	Course Code	Course Name
	Islamic educational philosophy, and the implementation of philosophical and educational philosophical values in educational practice (B) accurately and thoroughly (D)		
LOKD21	Through discussions and question-and-answer sessions, students are able to implement the concepts of reaction rates, solubility and solubility product, chemical equilibrium, acid-base theory and pH, buffer and hydrolysis, and thermochemistry accurately and responsibly	SEDC1002	BASIC CHEMISTRY II
LOKD22	Through discussions and question-and-answer sessions, students are able to analyze colloidal systems, colligative properties, voltaic cells and electrolysis, inorganic chemistry, as well as the structure, nomenclature, properties, and uses of carbon compounds (haloalkanes, alkanols, alkoxy alkanes), and the structure, nomenclature, properties, and classification of macromolecules accurately and responsibly		
LOPLR1	Through laboratory practicum, students are able to address problems in the preparation of solutions with required concentrations through accurate calculations and correct procedures	SEDC1008	CHEMICAL SOLUTIONS PRACTICUM
LOPLR2	Through laboratory activities, students are able to perform solution calibration and standardization by titration and prepare reagent solutions accurately and responsibly		
LOPLR3	Upon completing laboratory courses, students are able to manage the chemicals required for chemical practicum and research carefully and responsibly		
LOLR01	Through the analysis of concepts and theories related to the use of solutions in laboratory and chemical research activities (C), students (A) are able to work with solutions in chemical practicum and laboratory research (B) with precision and responsibility (D)	SEDC1006	CHEMICAL SOLUTIONS
LOLR02	Through lectures with innovative approaches and diverse teaching methods, students are able to calculate solution concentrations accurately and formulate steps for solution preparation based on concentration types for chemistry teaching and research correctly and thoroughly		
LOLR03	After participating in case-based lectures, students are able to design procedures for determining the concentration of a solute (such as acetic acid in commercial vinegar or HCl in floor cleaners) in a solution using appropriate methods		
LOKB11	Through group discussions and reference exploration (C), students (A) are able to determine the scope and sequence of Grade X high school chemistry content (B) independently, accurately, and thoroughly (D)	SEDC1009	CHEMISTRY TEACHING MATERIAL REVIEW I
LOKB12	Through group discussions and question-and-answer sessions (C), students (A) are able to complete practice questions related to Grade X high school chemistry content (B) correctly and thoroughly (D)		
LOKB13	Students (A) are able to design teaching materials for Grade X high school chemistry (B) through Project-Based Learning (PjBL) (C), producing materials such as handouts and student worksheets (LKPD), collaboratively, accurately, and thoroughly (D)		

CPMK Code	CPMK Description	Course Code	Course Name
LOCT01	Through the use of technology (C), students (A) are able to design various structures and reaction mechanisms of organic and inorganic compounds using ChemDraw and create interactive acid-base titration learning media using Microsoft Excel (B) (D)	SEDC1012	ICT IN CHEMISTRY LEARNING
LOCT02	After actively participating in lectures, students are able to design a simple website using HTML and create animated videos using the VideoScribe program creatively and innovatively		
LOGT01	Upon completing the course—through regular discussions, group work, scheduled assignments, and independent study—students demonstrate discipline, diligence, and responsibility	SEDC1014	GAS AND THERMODYNAMICS
LOGT02	After completing the course through student-centered learning models, students are able to analyze the properties of ideal and real gases based on the concept of the equation of state		
LOGT03	After completing the course through student-centered learning models, students are able to analyze the First Law of Thermodynamics through the concepts of system, surroundings, work, heat, energy, and enthalpy		
LOGT04	After completing the course through student-centered learning models, students are able to analyze the direction of spontaneous change in the Second and Third Laws of Thermodynamics through the concepts of entropy, heat engine efficiency, and the Gibbs and Helmholtz free energy functions accurately		
LOEN01	Able to analyze TOEFL concepts related to listening skills	MKWU1004	ENGLISH
LOEN02	Able to explain TOEFL concepts related to reading skills		
LOEN03	Able to explain TOEFL concepts related to language components (structure and written expression)		
LOEN04	Able to practice speaking skills (communication skills) integrated into TOEFL instruction		
LOPP01	Through discussions and question-and-answer sessions, students are able to describe the characteristics of individual developmental aspects and their relationship to the learning process accurately and responsibly	FEDU2001	PSYCHOLOGY EDUCATION
LOPP02	Through discussions and question-and-answer sessions, students are able to apply various approaches to learning in a group, rationally and carefully		
LOPP03	Through discussion and analysis of learning needs and issues, students are able to design instructional strategies professionally and responsibly		
LOMON1	After actively participating in lectures (C), students (A) are able to summarize the differences in organic compounds based on their sources, functional groups, structures, nomenclature, and biosynthesis (B, C4), enabling them to classify organic compounds accurately (D, A4)	SEDC2013	MONOFUNGSIONAL ORGANIC CHEMISTRY
LOMON2	After actively participating in lectures (C), students (A) are able to evaluate the usefulness of organic compounds based on the structure and elemental composition of carbon and hydrogen (C, H), carbon, hydrogen, and halogen (C, H, X), carbon, hydrogen, and oxygen (C, H, O), carbon, hydrogen, oxygen, and halogen (C, H, O, X), carbon, hydrogen, and nitrogen (C, H, N), carbon, hydrogen, nitrogen, and oxygen (C,		

CPMK Code	CPMK Description	Course Code	Course Name
	H, N, O), carbon, hydrogen, and sulfur (C, H, S), and carbon, hydrogen, nitrogen, and sulfur (C, H, N, S) (B, C5), so they are able to use these compounds (P4) and influence their use accurately (D, A5)		
LOMON3	After actively participating in lectures (C), students (A) are able to analyze the physical and chemical properties of organic compounds based on the structure and composition of carbon and hydrogen (C, H), carbon, hydrogen, and halogen (C, H, X), carbon, hydrogen, and oxygen (C, H, O), carbon, hydrogen, oxygen, and halogen (C, H, O, X), carbon, hydrogen, and nitrogen (C, H, N), carbon, hydrogen, nitrogen, and oxygen (C, H, N, O), carbon, hydrogen, and sulfur (C, H, S), and carbon, hydrogen, nitrogen, and sulfur (C, H, N, S) (B, C4), enabling them to use the data on these properties (P4) to manage them accurately (D, A4)		
LOKB21	Through reference exploration and discussion (C), students (A) are able to analyze scientific literacy in Grade XI chemistry learning materials (B) thoroughly and accurately (D)	SEDC1010	CHEMISTRY TEACHING MATERIAL REVIEW II
LOKB22	Students (A) are able to complete practice problems related to Grade XI senior high school chemistry content (B) through discussion and Q&A sessions (C) thoroughly and accurately (D)		
LOKB23	Students (A) are able to design Grade XI chemistry teaching materials in the form of handouts and student worksheets (LKPD) (B) through Project-Based Learning (PjBL) (C) thoroughly, responsibly, and independently (D)		
LOSBM1	After completing the course (C), students (A) are able to analyze the nature of teaching and learning strategies and analyze students' individual characteristics and learning difficulties in chemistry instruction (B) accurately (D)	SEDC2015	TEACHING AND LEARNING STRATEGY
LOSBM2	After completing the course (C), students (A) are able to identify basic teaching skills and stages of teaching based on instructional procedures, and differentiate between approaches, methods, and models of chemistry instruction (B) accurately (D)		
LOSBM3	After completing the course (C), students (A) are able to design learning activities based on appropriate approaches, methods, and models of instruction in accordance with the chemistry material (B) accurately (D)		
LOSBM4	After completing the course (C), students (A) are able to describe teaching variations and feedback techniques applicable in instruction, and are able to design classroom management, as well as remedial and enrichment learning activities based on the analysis of information and data (B) accurately and effectively (D)		
LOKAL1	After completing the course through discussion, exploration, and group work, students are able to design experiments using natural or locally sourced materials in the form of detailed and accurate laboratory manuals in accordance with senior high school chemistry curricula or their equivalents	SEDC2017	CHEMICAL QUALITATIVE ANALYSIS

CPMK Code	CPMK Description	Course Code	Course Name
LOKAL2	After completing the course through discussion, exploration, and group work, students are able to design experiments using natural or local materials in the form of detailed and accurate laboratory guides aligned with senior high school chemistry curricula		
LOKAL3	After completing the course through discussion, exploration, and group work, students are able to carry out experiments using natural or local materials in a detailed and accurate manner in accordance with senior high school chemistry curricula		
LOSKA1	Students are able to analyze the differences among various acid–base concepts through individual or group assignments by relating them to relevant chemical reaction cases	SEDC2019	STRUCTURE AND REACTIVITY OF INORGANIC COMPOUNDS
LOSKA2	Students are able to explain redox concepts and their applications in industry and daily life, both independently and in group discussions on relevant cases		
LOSKA3	Students are able to explain thermodynamic and electrochemical aspects in metal extraction, corrosion, and battery technologies through individual or group assignments related to relevant case studies		
LOKKF1	After attending lectures using student-centered learning models and methods, students are able to analyze the concept of dynamic equilibrium, equilibrium constants, factors affecting chemical equilibrium, and thermodynamics of chemical equilibrium	SEDC2023	CHEMICAL AND PHASE EQUILIBRIA
LOKKF2	After attending lectures using student-centered learning models and methods, students are able to understand phase equilibrium concepts, phase rules, components, degrees of freedom, and phase diagrams		
LOKKF3	Through discussion and analysis of the Clapeyron and Clausius-Clapeyron equations, students are able to derive and calculate the relationship between pressure and temperature in single- or two-component liquid systems, and apply this to calculations of colligative properties and the boiling point of water at various altitudes above sea level		
LOIKT1	Through discussions and Q&A sessions, students are able to understand the principles of quantum mechanics in explaining microscopic particle behavior accurately and responsibly	SEDC2021	CHEMICAL BONDS
LOIKT2	Through discussions and Q&A sessions, students are able to apply quantum theory concepts to explain electron movement in the hydrogen atom and multi-electron atoms, as well as atomic orbitals, accurately and responsibly		
LOIKT3	Through discussions and Q&A sessions, students are able to understand quantum theory concepts in explaining chemical bond formation accurately and responsibly		
LOKUR1	Through discussion activities, students are able to analyze the basic concepts, philosophy, and historical development of the curriculum in Indonesia, understand the meaning of curriculum in national education at macro and micro levels, and the structure and content of school curricula practically and confidently	FEDU2002	CURRICULUM AND LEARNING
LOKUR2	Through case study activities, students are able to explain the role of teachers as curriculum planners, developers, and implementers in schools according to their subject areas thoroughly		

CPMK Code	CPMK Description	Course Code	Course Name
LOKUR3	Through discussion activities, students are able to describe the philosophy of educating, teaching, and facilitating learning, and its relationship to educational practices in and outside of school in a collaborative manner		
LOMAG1	After actively participating in the course (C), students (A) are able to explain (B) curriculum management, classroom management, student management, and school office administration management that can be implemented in schools according to expert opinions in a precise, rational, and responsible manner (D)	FEDU1002	INTRODUCTION TO EDUCATIONAL MANAGEMENT
LOMAG2	After actively participating in the course (C), students (A) are able to explain (B) the contribution of school-based management to the implementation of managerial practices in schools accurately, measurably, and in accordance with applicable theories (D)		
LOMAG3	Students (A) are able to explain (B) techniques to build school-community relationships to support teacher professionalism development (D), and thus are able to formulate strategies (P) for effective school-community partnerships based on current conditions as evidence of completing the "Introduction to School Management" course (C)		
LOMAG4	After actively participating in the course (C), students (A) are able to explain (B) the interconnection between curriculum management, classroom management, student management, and school office administration management that can be implemented in schools based on expert views in a precise, rational, and responsible manner (D)		
LOKIN1	After completing the course using diverse models and strategies (C), students (A) are able to analyze the characteristics of chemical kinetics through the ideal gas kinetic theory approach (B) in relation to factors affecting reaction rates, reaction mechanisms, and activation energy (D)	SEDC2016	CHEMICAL KINETICS
LOKIN2	After completing the course using various models, methods, and strategies (C), students (A) are able to conclude the reaction rates of first, second, and third order based on experimental graphs, calculate the reaction rate constants, and understand mechanisms such as chain, branching, and equilibrium reactions (B) accurately and measurably (D)		
LOKIN3	Through problem investigation and reviewing relevant research findings (C), students (A) are able to apply research outcomes to solve reaction kinetics problems (B) related to adsorption, biodegradation, and chemical kinetics in accordance with their own research (D)		
LOPOL1	After completing the learning process actively (C), students (A) are able to accurately analyze (B, C4) the characteristics of each group of organic compounds: difunctional, polyfunctional, bicyclic, polycyclic, heterocyclic, heteroaromatic, and biomolecules, thus being able to develop (P4) skills in sorting (A4) reactions based on compound structures independently, accurately, and measurably (D)	SEDC2018	POLYFUNCTIONAL ORGANIC CHEMISTRY
LOPOL2	After completing the learning process actively (C), students (A) are able to accurately analyze (B, C4) groups of organic compounds such as difunctional, polyfunctional, bicyclic, polycyclic, heterocyclic,		

CPMK Code	CPMK Description	Course Code	Course Name
	heteroaromatic, and biomolecules, and sort them (A4) based on their properties, thereby being able to develop (P4) the skills to utilize those compounds independently, accurately, and measurably (D)		
LOMET1	After participating in lectures, discussions, and reviewing appropriate literature (C), students (A) are able to accurately (D) analyze the development of educational research theories and their stages	SEDC3040	RESEARCH METHODOLOGY
LOMET2	After participating in lectures, discussions, exercises, and referring to appropriate literature (C), students (A) are able to accurately prepare research plans or designs, research instruments, carry out research, and analyze research data		
LOEP01	Through discussion activities, students are able to analyze the objectives, functions, and essence of chemistry learning assessment accurately	SEDC2020	EVALUATION IN CHEMISTRY TEACHING
LOEP02	Through discussion activities, students are able to design the fundamentals of assessment and evaluation in chemistry learning accurately using both manual and digital methods		
LOEP03	Through discussion activities, students are able to analyze evaluation results and use them as a basis for preparing follow-up plans accurately using both manual and digital methods		
LOUGU1	Students are able to explain the chemical and physical properties, extraction/production methods, and uses of the elements and their compounds in groups 1, 2, and 13 of the periodic table through literature reviews related to current issues in inorganic chemistry, either individually or in groups	SEDC2022	MAIN GROUP ELEMENTS AND COMPOUNDS
LOUGU2	Students are able to explain the chemical and physical properties, extraction/production methods, and uses of the elements and their compounds in groups 14, 15, and 16 of the periodic table through literature reviews related to current issues in inorganic chemistry, either individually or in groups		
LOUGU3	After completing this course, students are able to explain the chemical and physical properties, extraction/production methods, and uses of the elements and their compounds in groups 17 and 18 of the periodic table through case discussions related to current issues in inorganic chemistry, either individually or in groups		
LOKAN1	After completing the course with various methods and strategies (C), students (A) are able to apply the steps of chemical analysis quantitatively (B) accurately and measurably (D)	SEDC2024	CHEMICAL QUANTITATIVE ANALYSIS
LOPOF1	Through discussions and Q&A sessions, students are able to analyze the basic concepts, requirements, roles and responsibilities of teachers, teacher professional ethics codes, teacher professional organizations, and required teacher competencies as well as their practical implementation accurately and responsibly	FEDU2004	PROFESSION OF EDUCATION

CPMK Code	CPMK Description	Course Code	Course Name
LOPOF2	Through discussions and Q&A sessions, students are able to describe the seven attitudinal targets of an innovative professional teacher, a fully-charactered professional teacher, and demonstrate those attitudes accurately, rationally, and responsibly		
LOPOF3	Through discussions and Q&A sessions, students are able to explain the concept of continuous professional development, teacher performance, teacher performance standards, factors affecting teacher performance, efforts to improve teacher performance, and the assessment of teacher performance accurately and responsibly		
LOPLP1	Able to examine and analyze learning tools, school administration, and classroom learning processes through observation activities and plan follow-up actions based on the observation results	FEDUP002	SCHOOL INTERNSHIP
LOPLP2	Able to design innovative and creative Learning Tools (lesson plans, media, student worksheets, teaching materials, and assessment instruments) by utilizing ICT, based on analysis from observation activities through effective verbal and non-verbal collaboration and communication with mentor teachers and supervising lecturers		
LOPLP3	Able to apply various strategies/approaches/models/methods, media, and assessment instruments in managing ICT-assisted classrooms during the teaching and learning process		
LOPLP4	Able to carry out non-teaching activities, both co-curricular and extracurricular, collaboratively with mentor teachers and all school members		
LOPLP5	Able to prepare a field school experience report using valid and original data		
LOPPK1	Students (A) are able to develop (B) chemistry learning tools based on the K-13 and the Merdeka curriculum through case study and project activities (C) through collaboration and research (D)	SEDC2026	CHEMISTRY TEACHING PLAN
LOPPK2	Students (A) are able to develop (B) assessments and scoring rubrics for chemistry learning tools based on the K-13 and Merdeka curriculum through case study and project activities (C) by working cooperatively and attentively (D)		
LOPPK3	Students (A) are able to evaluate (B) chemistry learning tools adopted from various sources that are oriented towards TPACK and 21st-century skills through case study activities (C), independently and confidently (D)		
LOPEM1	After actively completing the course (C), students (A) are able to understand the concept of separation (B), conventionally (paper chromatography, thin layer chromatography, and column chromatography) both qualitatively and quantitatively	SEDC3027	FUNDAMENTALS OF CHEMICAL SEPARATIONS
LOPEM2	After actively completing the course (C), students (A) are able to understand the concept of separation (B), through modern techniques (gas chromatography and HPLC) with accurate measurements		
LOPEM3	After actively completing the course (C), students (A) are able to understand the concept of separation (B), through modern techniques (supercritical chromatography, ion chromatography, and capillary electrophoresis) with accurate measurements		

CPMK Code	CPMK Description	Course Code	Course Name
LOSTA1	After attending the Statistics course, students are able to explain basic concepts in educational statistics, such as distribution, probability, and data analysis techniques using t-tests, correlation (r), and ANOVA, including hypothesis testing. Graduates are able to apply various statistical methods to analyze educational data and possess skills in using statistical software such as SPSS	SEDC3029	STATISTICS
LOUGT1	Students are able to explain the chemical and physical properties, extraction of transition elements, and their uses through independent or group assignments discussing relevant cases	SEDC3031	TRANSITION ELEMENTS AND COORDINATION CHEMISTRY
LOUGT2	Students are able to explain the nomenclature, structure, and reactivity of coordination compounds through contextual independent or group assignments		
LOPKA1	After actively completing the course (C), students (A) are skilled in operating analytical instruments to analyze samples (B), both qualitatively and quantitatively (D)	SEDC3037	ANALYTICAL CHEMISTRY PRACTICUM
LOPKF1	After completing laboratory practicum activities, students are able to take responsibility in measuring variables (temperature, pressure, heat or energy, rate, and other physical properties) in the laboratory accurately and thoroughly	SEDC2028	PHYSICAL CHEMISTRY PRACTICUM
LOPKF2	After completing laboratory practicum activities, students are able to measure determining variables (temperature, pressure, heat or energy, reaction and flow rate, viscosity, acidity, conductivity, surface tension, adsorption, etc.) to analyze the relationship between one variable and another dependent variable accurately and correctly		
LOPKF3	After completing the course through experimental methods, students are able to analyze and conclude the relationship between measured variable data and dependent variable data from the experiment results		
LOPKO1	After actively participating in practicum activities (C), students (A) are able to identify organic compounds of primary and secondary metabolite groups (B, C4), and thus are able to use them (P4) to validate findings accurately (D, A4)	SEDC3035	ORGANIC CHEMISTRY PRACTICUM
LOPKO2	After actively participating in practicum activities (C), students (A) are able to construct molecular configuration models of organic compounds based on their classification (D-L, R-S, Cis-Trans, E-Z) (B, C6), and thus are able to apply them (P4) for accurate verification (D, A4)		
LOPKO3	After actively participating in practicum activities (C), students (A) are able to test salicylic acid and methyl salicylate products designed by their group (B, C4), and therefore are able to produce them (P3) for accurate validation (D, A5)		
LORRO1	After actively participating in the course (C), students (A) are able to analyze the breaking and forming of chemical bonds in organic compounds based on oxidation and reduction reaction mechanisms (B, C4), and therefore are able to construct the reaction mechanisms of various organic compounds (P2) to clarify the stages accurately (D, A3)	SEDC3033	ORGANIC REACTIONS

CPMK Code	CPMK Description	Course Code	Course Name
LORRO2	After actively participating in the course (C), students (A) are able to analyze the breaking and forming of chemical bonds in organic compounds based on electrophilic and nucleophilic substitution reaction mechanisms (B, C4), and therefore are able to construct the reaction mechanisms of various organic compounds (P2) to clarify the stages accurately (D, A3)		
LORRO3	After actively participating in the course (C), students (A) are able to analyze the breaking and forming of chemical bonds in organic compounds based on elimination, radical, addition, and pericyclic reaction mechanisms (B, C4), and therefore are able to construct the reaction mechanisms of various organic compounds (P2) to clarify the stages accurately (D, A3)		
LOMIC1	Through exploration activities, students are able to examine and analyze 21st-century learning approaches and models accurately	FEDUP001	MICRO TEACHING
LOMIC2	Through exploration activities, students are able to design innovative and creative learning tools (lesson plans, teaching materials, student worksheets, assessments, and learning media) by utilizing ICT in accordance with the applicable curriculum		
LOMIC3	Through peer-teaching activities, students are able to simulate limited teaching practice skills using ICT in accordance with the components of micro-teaching basic teaching skills properly and correctly		
LOMIC4	Through peer-teaching activities, students are able to apply various strategies/approaches/models/methods, media, and ICT-based evaluation instruments through integrated teaching skill simulations based on teaching skill assessment indicators and evaluations collaboratively with lecturers and peers		
LOKKN1	Guided by Islamic values, values developed by USK, and local cultural values, students are able to adapt quickly in the Community Service Program (KKN) location, enabling them to interact and actively participate in various community activities harmoniously, respectfully, and responsibly	MKWUP001	COMMUNITY SERVICE PROGRAM
LOKKN2	Based on literature review, initial information from the village, and guidance from the supervising lecturer, students are able to prepare activity proposals that are appropriate to the conditions and needs of the KKN destination village accurately, measurably, and comprehensively in accordance with their field of study and skills		
LOKKN3	Guided by the approved proposal, students are able to implement the activities listed in the proposal previously approved by the supervising lecturer and compile the implementation report honestly, measurably, and thoroughly		
LOKAI1	After actively participating in the course (C), students (A) understand the basic principles of UV/Vis spectrophotometry and FTIR analysis techniques and interpret analytical data (B) accurately (D)	SEDC3032	INSTRUMENTAL CHEMICAL ANALYSIS

CPMK Code	CPMK Description	Course Code	Course Name
LOKAI2	After actively participating in the course (C), students (A) understand the basic principles of MS and NMR analysis techniques and interpret analytical data (B) accurately (D)		
LOKAI3	After actively participating in the course (C), students (A) understand the basic principles of X-Ray analysis techniques and interpret analytical data (B) accurately (D)		
LOPBO1	After actively completing the practicum process (C), students (A) are able to accurately analyze (B, C4) experiments on carbohydrate, protein, and fat tests, and thus are able to develop (P4) the skills to implement acquired biochemical knowledge in daily life (A4) independently, accurately, and measurably (D)	SEDC3041	BIOCHEMISTRY PRACTICUM
LOPBO2	After actively completing the practicum process (C), students (A) are able to accurately analyze (B, C4) enzyme activity, sterilization, and basic microbiology techniques, and thus are able to develop (P4) the skills to implement acquired biochemical knowledge in daily life (A4) independently, accurately, and measurably (D)		
LOBIO1	After actively completing the lecture process (C), students (A) are able to accurately analyze (B, C4) the philosophy of biochemistry, cells and their components, enzymes, enzyme reaction kinetics, bioenergetics, general metabolism, carbohydrate metabolism, and the respiratory chain, and thus are able to develop (P4) the skills to implement acquired biochemical knowledge in daily life (A4) independently, accurately, and measurably (D)	SEDC3039	BIOCHEMISTRY
LOBIO2	After actively completing the lecture process (C), students (A) are able to accurately analyze (B, C4) the Krebs cycle, electron transport and oxidative phosphorylation, photosynthesis processes and products, fat metabolism, amino acid metabolism, protein biosynthesis, and nucleic acid base metabolism, and thus are able to develop (P4) the skills to implement acquired biochemical knowledge in daily life (A4) independently, accurately, and measurably (D)		
LOPAN1	Students are able to practice the synthesis of several inorganic elements/compounds based on chemical concepts through activities and performance reports in practical work accurately and responsibly	SEDC3034	INORGANIC CHEMISTRY PRACTICUM
LOPAN2	Students are able to practice science process skills related to inorganic chemistry through laboratory activities creatively, accurately, and responsibly		
LOLAB1	After actively completing the lecture process (C), students (A) are able to accurately analyze (B, C4) the scope of laboratory management lectures, the function and role of laboratories in supporting chemistry learning, and the function and importance of instrumentation in chemistry labs, and thus are able to develop (P4) the skills to implement chemistry laboratory knowledge in daily life (A4) independently, accurately, and measurably (D)	SEDC3036	LABORATORY MANAGEMENT
LOLAB2	After actively completing the lecture process (C), students (A) are able to accurately analyze (B, C4) the process of calibrating measuring instruments in chemistry laboratories, risks and safety in the laboratory, and managing laboratories based on information and data analysis while paying attention to health and		

CPMK Code	CPMK Description	Course Code	Course Name
	safety, and thus are able to develop (P4) the skills to implement acquired laboratory knowledge in daily life (A4) independently, accurately, and measurably (D)		
LOKB31	Students are able to master and demonstrate skills in solving chemistry practice questions in accordance with the scope and sequence of Grade XII Senior High School or equivalent	SEDC2025	CHEMISTRY TEACHING MATERIAL REVIEW III
LOKB32	Students are able to analyze misconceptions in chemistry teaching materials, particularly those aligned with the scope and sequence of Grade XII Senior High School or equivalent, through literature review, discussion, and document observation (teaching materials), and report the findings in a scientific paper		
LOKB33	Students are able to demonstrate skills in systematically developing simple teaching materials (student worksheets and handouts) through group work		
LOTERR1	After actively participating in the course (C), students (A) are able to conclude the role of chemistry in producing various products used in daily life (B, C4), and are thus able to produce such materials (P2) to manage them appropriately (D, A4)	SEDC3043	APPLIED CHEMISTRY
LOTERR2	After completing a project on converting raw materials into products with higher economic value (C), students (A) are able to demonstrate the raw material conversion process involving chemical concepts (B, C3), and are thus able to produce products (P2) to convince consumers in a limited setting (D, A3)		
LOMOL1	After participating in lectures using various methods, models, and strategies (C), students (A) are able to analyze the role of UV-Vis, IR, and NMR spectroscopy in the analysis of chemical compounds, calculate moments of inertia, rotational energy levels, and bond lengths (B) with precision (D)	SEDC3038	MOLECULAR SPECTROSCOPY
LOMOL2	Through Project-Based Learning (C), students (A) are able to synthesize Carbon Quantum Dots using various natural sources and characterize them using UV lamps and UV-Vis spectroscopy (B) accurately and precisely (D)		
LOMOL3	After participating in lectures using various methods, models, and strategies (C), students (A) are able to analyze molecular symmetry, determine the point group of a compound based on its molecular shape, understand the concepts of photochemistry such as fluorescence, phosphorescence, and LASER, and analyze their applications in the determination of chemical structures (B) accurately (D)		
LOSEM1	Students are able to plan simple research projects, either in the field of science or other innovative activities, individually or in groups, related to science and technology or entrepreneurship	SEDC3030	CHEMISTRY SEMINAR
LOSEM2	Students are able to conduct simple research through literature studies, laboratory activities, or entrepreneurial products and report the results in the form of a poster, product display, or performance presentation		
LOTA01	Students are able to write a research proposal and present it in a proposal seminar individually under the guidance of a lecturer appointed by the Department of Chemistry Education	FEDUPA01	SCRIPT
LOTA02	Students are able to conduct scientific research and write a thesis under the supervision of a lecturer appointed by the Department of Chemistry Education		

CPMK Code	CPMK Description	Course Code	Course Name
LOTA03	Students are able to conduct scientific research and write a thesis under the supervision of a lecturer appointed by the Department of Chemistry Education		
LOTA04	Students are able to individually present their thesis research during a thesis defense/final project seminar attended by examiners to verify research results and relate them to relevant theories		
LONIL1	After participating in the course (C), students (A) are able to explain the definitions of values, morals, character, and ethics, and describe the historical development of values education (B) accurately (D)	SEDC6045	REVIEW OF VALUES IN CHEMISTRY LEARNING
LONIL2	After participating in the course (C), students (A) are able to explain the philosophy of values education and the stages of its development (B) accurately (D)		
LONIL3	After participating in the course (C), students (A) are able to explain the importance of values education in chemistry learning and identify the values embedded in chemistry learning (B) accurately		
LONIL4	After participating in the course (C), students (A) are able to analyze the values embedded in a chemistry topic or material and review chemistry learning tools based on values education (B) thoroughly and accurately (D)		
LOPOL1	After completing the course, students are able to analyze the concept of macromolecules, analyze and characterize environmentally friendly films from natural materials using advanced techniques, and evaluate the potential of utilizing environmentally friendly raw materials for packaging films	SEDC6047	POLYMER CHEMISTRY
LOPOL2	After completing the course, students are able to independently, carefully, and precisely synthesize and characterize environmentally friendly packaging films from renewable natural materials, and apply them in designing project-based chemistry learning		
LOPGN1	After actively participating in the course (C), students (A) are able to analyze chemical compounds categorized as food and non-food substances based on their types, characteristics, uses, and sources (B, C4), and are thus able to utilize them (P4) to maintain their availability appropriately (D, A4)	SEDC6049	FOOD CHEMISTRY
LOPGN2	After actively participating in the course (C), students (A) are able to analyze chemical compounds categorized as food additives, including colorants, flavoring agents, additives, and toxic substances (B, C4), and are thus able to classify them (P2) to influence their proper use (D, A5)		
LOKEA1	After participating in the course (C), students (A) are able to understand the principles of and analyze chemical electroanalysis (electrochemistry and electrolysis) (B) according to Faraday's and Nernst's Laws with precision (D)	SEDC6046	ELECTROANALYTICAL CHEMISTRY
LOKEA2	After participating in the course (C), students (A) are able to understand the principles of and analyze chemical electroanalysis (potentiometry and conductometry) (B) according to Faraday's and Nernst's Laws with precision (D)		
LOKEA3	After participating in the course (C), students (A) are able to understand the principles of and analyze chemical electroanalysis (polarography and voltammetry) (B) according to Faraday's and Nernst's Laws with precision (D)		

CPMK Code	CPMK Description	Course Code	Course Name
LOPS01	After participating in the course, engaging in discussions, and reviewing relevant literature (C), students (A) are able to accurately (D) analyze (B, C4) and integrate (B, A4) theories underlying the application (P2) of UV-Vis spectroscopy, IR spectroscopy, mass spectrometry, and NMR spectroscopy to determine the structures of organic molecules	SEDC2019	STRUCTURE DETERMINATION OF ORGANIC COMPOUNDS
LOPS02	After participating in the course, engaging in discussions, practice, and referring to appropriate literature (C), students (A) are able to accurately construct (C6) molecular formulas and structural formulas of organic compounds through the skills of managing (P5) and organizing (A4) UV-Vis, IR, mass, and NMR spectral data		
LOMED1	Through problem analysis and literature review (C), students (A) are able to formulate criteria for selecting instructional media that match the characteristics of teaching materials to solve chemistry teaching problems in schools (B) accurately and measurably (D)	SEDC6059	CHEMISTRY LEARNING MEDIA
LOMED2	Through Project-Based Learning (C), students (A) are able to design and develop chemistry learning media using simple resources and/or ICT-based tools including AI, AR, and VR to enhance the quality of chemistry instruction (B) either in groups or individually (D)		
LOKAI1	Students are able to explain the role of inorganic compounds in popular industries through writing in a popular style that can be understood by students	SEDC6061	INDUSTRIAL INORGANIC CHEMISTRY
LOKAI2	Students are able to analyze the role of inorganic compounds in popular industries through independent or group assignments in the context of pollution cases and their mitigation efforts		
LORAD1	Through discussion and question-and-answer activities, students are able to understand the concept of nuclear chemistry, the emission processes of various radioactive rays, and the use of radiotracers in various fields accurately and responsibly	SEDC6063	RADIOCHEMISTRY
LORAD2	Through case studies, students are able to analyze the dangers of radioactive radiation and the efforts for its prevention and mitigation accurately and responsibly		
LOPTK1	After completing the course, students are able to analyze the basic concepts of pedagogy and apply TPACK in chemistry teaching through educational research independently, accurately, and precisely	SEDC6065	ACTION RESEARCH
LOPTK2	After completing the course, students are able to identify problems in chemistry teaching, select and analyze actions, plan and prepare instruments for action research, analyze and interpret data, and compile the final report of the action research carefully, accurately, with discipline and full responsibility		
LOMAS1	Students are able to analyze the nature of learning, instruction, and the factors influencing learning through discussions supported by relevant and credible references	SEDC6067	CHEMISTRY LEARNING PROBLEMS REVIEW
LOMAS2	Students are able to examine students' learning difficulties in chemistry based on research findings and case studies in schools through systematic group work and exploration		

CPMK Code	CPMK Description	Course Code	Course Name
LOMAS3	Students are able to propose solutions to chemistry learning problems in schools through scholarly written articles		
LOMIN1	Through problem-based study and literature review (C), students (A) are able to apply chemical knowledge to classify various types of minerals based on their physical and chemical properties in nature (B) accurately (D)	SEDC6069	MINERALOGY
LOMIN2	Through problem-based study and literature review (C), students (A) are able to apply chemical knowledge to classify crystal structures according to their mineral types (B) accurately (D)		
LOVAL1	After actively participating in lectures (C), students (A) are able to explain the basic concepts of instrumental analysis method validation, including parameters to be evaluated such as linearity, precision, accuracy, detection limit, robustness, quantification limit, and specificity (B) in a careful and accurate manner (D)	SEDC6073	VALIDATION OF INSTRUMENTAL ANALYTICAL METHODS
LOEKS1	Upon completing the course through discussion, exploration, and group work, students are able to design experiments using natural or local environmental materials in the form of detailed and accurate practicum guides aligned with high school chemistry curricula (B)	SEDC6075	SCHOOL CHEMISTRY EXPERIMENTS
LOEKS2	Upon completing the course through discussion, exploration, and group work, students are able to conduct experiments using natural or local environmental materials in a detailed and accurate manner aligned with high school chemistry curricula (B)		
LOEKS3	Upon completing the course through discussion, exploration, and group work, students are able to implement experiments using natural or local environmental materials in a detailed and accurate manner aligned with high school chemistry curricula (B)		
LOLIN1	After actively participating in lectures (C), students (A) are able to analyze types of pollution and the techniques for handling them (B, C4), enabling them to develop solutions (P2) to maintain environmental balance accurately (D, A4)	SEDC6077	ENVIRONMENTAL CHEMISTRY
LOLIN2	After actively participating in lectures (C), students (A) are able to conclude the correlation between chemical compounds and the environment based on their presence and transformation processes (B, C4), enabling them to identify (P2) and manage them appropriately (D, A4)		
LOLIN3	After actively participating in lectures (C), students (A) are able to analyze material cycles and environmental sanitation (B, C4), enabling them to create sustainable environments (P5) to preserve ecological balance accurately (D, A4)		
LOTEK1	After completing the course through active participation (C), students (A) are able to accurately analyze (B, C4) classical biotechnology including tape fermentation, tempeh production, the involved microorganisms, and their biosynthetic pathways, thereby enabling them to develop (P4) the skills to implement biotechnological knowledge in daily life (A4) independently, accurately, and measurably (D)	SEDC6079	BIOTECHNOLOGY

CPMK Code	CPMK Description	Course Code	Course Name
LOTEK2	After completing the course through active participation (C), students (A) are able to accurately analyze (B, C4) modern biotechnology, biotechnology ethics, vaccine development, insulin production, and recombinant DNA technology, thereby enabling them to develop (P4) the skills to implement biotechnological knowledge in daily life (A4) independently, accurately, and measurably (D)		
LOKPP1	After completing the course through student-centered learning, students are able to analyze surface thermodynamics and interfacial phenomena, and determine interfacial tension in liquids	SEDC6081	SOLOIDS AND SURFACE CHEMISTRY
LOKPP2	After completing the course through student-centered learning, students are able to formulate the Gibbs adsorption equation, explain the classification of adsorption isotherms, and apply the Langmuir and Freundlich isotherms in adsorption-related research		
LOKPP3	After completing the course through student-centered learning, students are able to identify various crystal forms, calculate atomic radii and crystal density in cubic systems, and distinguish between FCC and BCC crystal types based on X-ray data		
LOBAN1	Students are able to analyze the role of metal minerals in biological systems through individual or group assignments in the context of diseases, deficiencies, or poisoning	SEDC6048	BIOINORGANIC
LOBAN2	Students are able to explain the role of inorganic compounds (including complex compounds) in the medical field through individual or group assignments to understand common disease diagnoses or therapies		
LOKOB1	After actively participating in lectures (C), students (A) are able to construct the basis for grouping secondary metabolite compounds based on their structure, classification, names, uses, and sources (B, C4), thereby enabling them to use (P4) this knowledge for accurate classification (D, A4)	SEDC6085	ORGANIC CHEMISTRY NATURAL RESOURCE
LOKOB2	After actively participating in lectures (C), students (A) are able to categorize secondary metabolite compounds based on their biosynthetic pathways, identification, and isolation methods (B, C6), thereby enabling them to identify (P4) and validate them accurately (D, A5)		
LOWIR1	Through project-based learning, students are able to apply the principles of chemistry to produce entrepreneurial products in the form of goods or services that are safe and beneficial, upholding honesty, precision, and community welfare	SEDC3042	CHEMISTRY ENTREPRENEURSHIP
LOWIR2	Through project-based learning, students are able to market entrepreneurial products through various e-commerce platforms accurately and sustainably		
LOPWR1	Through project-based learning, students are able to apply the principles of chemistry to produce entrepreneurial products in the form of goods or services that are good and safe by prioritizing the principles of honesty, accuracy and community welfare.	SEDC3044	CHEMISTRY ENTREPRENEURSHIP PRACTICE

CPMK Code	CPMK Description	Course Code	Course Name
LOSTE1	Students are able to present the role of STEM/STEAM/STEAMC in education through group or individual work by discussing contemporary context-based case studies	SEDC6050	STEAMC IN CHEMISTRY
LOSTE2	Students are able to plan and implement STEM/STEAM/STEAMC practices through group or individual work by analyzing technological, artistic, or entrepreneurial needs and developing scientifically proven solutions		
LODPI1	After completing the course with student-centered learning and appropriate strategies, students are able to integrate school-level chemistry knowledge, pedagogy, and ICT into innovative chemistry teaching tailored to students' characteristics	SEDC6052	INNOVATIVE LEARNING DESIGN
LODPI2	After completing the course through the Case Method and Project-Based Learning (PjBL), students are able to design and evaluate innovative and adaptive chemistry learning plans in accordance with the characteristics of the subject matter (content knowledge) and students' characteristics, learning approaches, learning resources, instructional media (pedagogical knowledge), as well as relevant information and communication technologies (technological knowledge)		
LOATS1	After actively participating in lectures (C), students (A) are able to analyze the characteristics of essential oils based on their sources, uses, and chemical components (B, C5), enabling them to isolate and identify (P2) the essential oils to accurately demonstrate their characteristics (D, A4)	SEDC6054	CHEMISTRY OF ESSENTIAL OILS
LOATS2	After actively participating in field studies (C), students (A) are able to obtain information from practitioners at essential oil production centers (B, C3), enabling them to document and report the survey activities to the essential oil production center (P2) and present them comprehensively in class discussion forums (D, A2)		
LOKPS1	After actively participating in lectures (C), students (A) are able to conclude waste-related issues based on types, sources, and characteristics (B, C4), enabling them to identify (P2) and manage the waste accurately (D, A4). They are also able to conclude urban/market waste problems based on types, sources, and characteristics (B, C4), enabling them to identify (P2) and manage the waste accurately (D, A4)	SEDC6057	CHEMISTRY OF WASTE MANAGEMENT
LOKPS2	After actively participating in field studies (C), students (A) are able to obtain information from the community and relevant personnel at markets, temporary waste disposal sites (TPS), and final waste disposal sites (TPA) regarding the waste management mechanisms (B, C3), enabling them to document and report the survey activities (P2) and present them comprehensively in class discussion forums (D, A2)		
LOKPS3	After actively participating in lectures (C), students (A) are able to conclude waste-related issues based on types, sources, and characteristics (B, C4), enabling them to identify (P2) and manage the waste accurately (D, A4)		
LOKPS4	After actively participating in field studies (C), students (A) are able to obtain information from the community and relevant personnel at markets, temporary waste disposal sites (TPS), and final waste		

CPMK Code	CPMK Description	Course Code	Course Name
	disposal sites (TPA) regarding the waste management mechanisms (B, C3), enabling them to document and report the survey activities (P2) and present them comprehensively in class discussion forums (D, A2)		
LOVIR1	Through project-based learning, students are skilled in using various virtual chemistry platforms accurately and responsibly	SEDC6058	VIRTUAL CHEMISTRY
LOVIR2	Through project-based learning, students are able to develop virtual chemistry teaching materials based on digital platforms accurately and appropriately		
LOGEC1	Through problem and literature review (C), students (A) are able to explain the principles of green chemistry in reducing environmental impacts of chemical activities (B) in a sustainable manner (D)	SEDC6053	GREEN CHEMISTRY
LOFOR1	After actively participating in lectures, students are able to describe the types of criminal evidence and the correct procedures for collecting, preserving, inventorying, and transporting them accurately, rationally, and responsibly	SEDC6055	FORENSIC CHEMISTRY
LOFOR2	After attending lectures, students are able to analyze the principles, theories, and applications of chemical technologies used for forensic evidence analysis accurately and specifically		
LOFOR3	After conducting laboratory practices, students are able to gain knowledge on how to interpret meaningful data from analytical/forensic measurements accurately and responsibly		
LOMIK1	After actively completing the learning process (C), students (A) are able to accurately analyze (B, C4) topics related to cell communication, including bacterial cell communication mechanisms, plant cell communication, and animal cell communication, thus enabling them to develop (P4) skills in implementing acquired microbial chemistry knowledge in daily life (A4) independently, accurately, and measurably (D)	SEDC6071	MICROBIAL CHEMISTRY
LOMIK2	After actively completing the learning process (C), students (A) are able to accurately analyze (B, C4) various types of chemical compounds used for cell communication among bacterial cells, animal cells, plant cells, and quorum sensing, thus enabling them to develop (P4) skills in implementing acquired microbial chemistry knowledge in daily life (A4) independently, accurately, and measurably (D)		
LOBIN1	After actively completing the learning process (C), students (A) are able to accurately analyze (B, C4) the industrialization of biochemical and biotechnological products, recognizing Biofarma and its products, thus enabling them to develop (P4) skills in implementing acquired bioindustry knowledge in daily life (A4) independently, accurately, and measurably (D)	SEDC6056	INDUSTRIAL BIOCHEMISTRY
LOBIN2	After actively completing the learning process (C), students (A) are able to accurately analyze (B, C4) topics related to PT Paragon, its derivative products, and career opportunities at PT Paragon and PT Biofarma, thus enabling them to develop (P4) skills in implementing acquired bioindustry knowledge in daily life (A4) independently, accurately, and measurably (D)		

Tabel 3.6 Course Title and Its Relation to CPL

Code	Course Title	CPL Code (marked with a $\checkmark$ in the appropriate CPL component column)						
		CPL-01	CPL-02	CPL-03	CPL-04	CPL-05	CPL-06	CPL-07
MKWU1003	INDONESIAN LANGUAGE	$\checkmark$						
MKWU1005	DISASTER AND ENVIRONMENTAL STUDIES	$\checkmark$		$\checkmark$				
FEDU1001	FUNDAMENTAL OF EDUCATION		$\checkmark$					
SEDC1001	BASIC CHEMISTRY I	$\checkmark$		$\checkmark$				
SEDC1003	BASIC CHEMICAL PRACTICUM I	$\checkmark$					$\checkmark$	
SEDC1004	BASIC CHEMICAL PRACTICUM II	$\checkmark$					$\checkmark$	
SEDC1007	COMPUTER APPLICATION			$\checkmark$	$\checkmark$			
SEDC1011	MATHEMATICS FOR CHEMISTRY			$\checkmark$				
SEDC1005	STOICHIOMETRY			$\checkmark$		$\checkmark$		
MKWU1002	CIVICS EDUCATION	$\checkmark$						
MKWU2001	RELIGIOUS STUDIES	$\checkmark$						
MKWU1001	PANCASILA	$\checkmark$						
FEDU2003	PHILOSOPHY OF EDUCATION		$\checkmark$					
SEDC1002	BASIC CHEMISTRY II	$\checkmark$		$\checkmark$				
SEDC1008	CHEMICAL SOLUTIONS PRACTICUM	$\checkmark$					$\checkmark$	
SEDC1006	CHEMICAL SOLUTIONS			$\checkmark$			$\checkmark$	
SEDC1009	CHEMISTRY TEACHING MATERIAL REVIEW I			$\checkmark$				
SEDC1012	ICT IN CHEMISTRY LEARNING			$\checkmark$	$\checkmark$			
SEDC1014	GASES AND THERMODYNAMICS	$\checkmark$		$\checkmark$				
MKWU1004	ENGLISH	$\checkmark$						
FEDU2001	PSYCHOLOGY EDUCATION		$\checkmark$					
SEDC2001	MONOFUNGSIONAL ORGANIC CHEMISTRY	$\checkmark$		$\checkmark$				
SEDC1010	CHEMISTRY TEACHING MATERIAL REVIEW II			$\checkmark$	$\checkmark$			
SEDC2015	TEACHING AND LEARNING STRATEGY		$\checkmark$					
SEDC2017	CHEMICAL QUALITATIVE ANALYSIS			$\checkmark$				
SEDC2019	STRUCTURE AND REACTIVITY OF INORGANIC COMPOUNDS			$\checkmark$				
SEDC2023	CHEMICAL AND PHASE EQUILIBRIA			$\checkmark$				
SEDC2021	CHEMICAL BONDS	$\checkmark$		$\checkmark$				
FEDU2002	CURRICULUM AND LEARNING		$\checkmark$					

Code	Course Title	CPL Code (marked with a ✓ in the appropriate CPL component column)						
		CPL-01	CPL-02	CPL-03	CPL-04	CPL-05	CPL-06	CPL-07
FEDU1002	INTRODUCTION TO EDUCATIONAL MANAGEMENT	✓	✓					
SEDC2016	CHEMICAL KINETICS			✓		✓		
SEDC2018	POLYFUNCTIONAL ORGANIC CHEMISTRY	✓		✓				
SEDC3040	RESEARCH METHODOLOGY				✓			
SEDC2020	EVALUATION IN CHEMISTRY TEACHING		✓	✓				
SEDC2022	MAIN GROUP ELEMENTS AND COMPOUNDS			✓		✓		
SEDC2024	CHEMICAL QUANTITATIVE ANALYSIS			✓				
FEDU2004	PROFESSION OF EDUCATION		✓					
FEDUP002	SCHOOL INTERNSHIP	✓			✓	✓		
SEDC2026	CHEMISTRY TEACHING PLAN				✓			
SEDC3027	FUNDAMENTALS OF CHEMICAL SEPARATIONS			✓				
SEDC3029	STATISTICS			✓				
SEDC3031	TRANSITION ELEMENTS AND COORDINATION CHEMISTRY			✓				
SEDC3037	ANALYTICAL CHEMISTRY PRACTICUM						✓	
SEDC2028	PHYSICAL CHEMISTRY PRACTICUM	✓					✓	
SEDC3035	ORGANIC CHEMISTRY PRACTICUM	✓					✓	
SEDC3033	ORGANIC REACTIONS			✓				
FEDUP001	MICRO TEACHING		✓	✓	✓			
MKWUP001	COMMUNITY SERVICE PROGRAM	✓				✓		
SEDC3032	INSTRUMENTAL CHEMICAL ANALYSIS			✓				
SEDC3041	BIOCHEMISTRY PRACTICUM						✓	
SEDC3039	BIOCHEMISTRY			✓				
SEDC3034	INORGANIC CHEMISTRY PRACTICUM					✓	✓	
SEDC3036	LABORATORY MANAGEMENT			✓	✓			
SEDC2025	CHEMISTRY TEACHING MATERIAL REVIEW III			✓	✓			
SEDC3043	APPLIED CHEMISTRY			✓				✓
SEDC3038	MOLECULAR SPECTROSCOPY			✓		✓		
SEDC3030	CHEMISTRY SEMINAR	✓					✓	
FEDUPA01	SCRIPT		✓	✓		✓	✓	

Code	Course Title	CPL Code (marked with a ✓ in the appropriate CPL component column)						
		CPL-01	CPL-02	CPL-03	CPL-04	CPL-05	CPL-06	CPL-07
SEDC6045	REVIEW OF VALUES IN CHEMISTRY LEARNING		✓					
SEDC6047	POLYMER CHEMISTRY			✓		✓		
SEDC6049	FOOD CHEMISTRY			✓				
SEDC6046	ELECTROANALYTICAL CHEMISTRY			✓				
SEDC2019	STRUCTURE DETERMINATION OF ORGANIC COMPOUNDS	✓		✓				
SEDC6059	CHEMISTRY LEARNING MEDIA		✓					
SEDC6061	INDUSTRIAL INORGANIC CHEMISTRY			✓				
SEDC6063	RADIOCHEMISTRY	✓		✓				
SEDC6065	ACTION RESEARCH	✓	✓					
SEDC6067	CHEMISTRY LEARNING PROBLEMS REVIEW		✓					
SEDC6069	MINERALOGY			✓				
SEDC6073	VALIDATION OF INSTRUMENTAL ANALYTICAL METHODS			✓				
SEDC6075	SCHOOL CHEMISTRY EXPERIMENTS	✓		✓				
SEDC6077	ENVIRONMENTAL CHEMISTRY	✓		✓				
SEDC6079	BIOTECHNOLOGY			✓				
SEDC6081	SOLOIDS AND SURFACE CHEMISTRY			✓		✓		
SEDC6048	BIOINORGANIC			✓				
SEDC6085	ORGANIC CHEMISTRY NATURAL RESOURCE			✓				
SEDC3042	CHEMISTRY ENTREPRENEURSHIP	✓						✓
SEDC3044	CHEMISTRY ENTREPRENEURSHIP PRACTICE							✓
SEDC6050	STEAMC IN CHEMISTRY			✓		✓		
SEDC6052	INNOVATIVE LEARNING DESIGN		✓		✓			
SEDC6054	CHEMISTRY OF ESSENTIAL OILS		✓					✓
SEDC6057	CHEMISTRY OF WASTE MANAGEMENT	✓		✓				
SEDC6058	VIRTUAL CHEMISTRY	✓			✓			
SEDC6053	GREEN CHEMISTRY	✓						
SEDC6055	FORENSIC CHEMISTRY	✓		✓			✓	

Code	Course Title	CPL Code (marked with a √ in the appropriate CPL component column)						
		CPL-01	CPL-02	CPL-03	CPL-04	CPL-05	CPL-06	CPL-07
SEDC6071	MICROBIAL CHEMISTRY			√				
SEDC6056	INDUSTRIAL BIOCHEMISTRY			√				
SEDC6051	TEACHING AND LEARNING THEORIES IN CHEMISTRY	√			√			

Table 3.7. Description of Subject Matter

Code	Subject Matter	Description
	(Course Name)	
MKWU1003	INDONESIAN LANGUAGE	Students are expected to understand the following: (1) the nature, position, and function of the Indonesian language; the attitude toward using the Indonesian language; and scientific Indonesian as a form of piety to God Almighty and upholding life values; (2) spelling; (3) word formation; (4) diction; (5) sentences; (6) paragraphs; (7) scientific writing; (8) technical report writing; and (9) official letter writing, including evaluation and documentation. Creativity, independence, and honesty are also required in this course.
MKWU1005	DISASTER AND ENVIRONMENTAL STUDIES	This course aims to provide students with insights and an introduction to the basic principles of disaster risk reduction and its relation to environmental conditions in disaster-prone areas. The main focus of the course is on understanding the key elements of disaster risk reduction that must be considered in sustainable development planning in vulnerable regions (which may focus on the most dominant types of disasters) and/or areas experiencing environmental degradation (including climate change issues). This course also encourages students to care for the environment and act responsibly.
FEDU1001	FUNDAMENTAL OF EDUCATION	This course guides students to understand the nature of human beings, the dimensions of human nature and its development, the nature of education, education as a system, components of education, educational environment, educational philosophies, and the foundations of education: juridical, philosophical, historical, socio-cultural, psychological, and scientific-technological. It also covers principles of education, educational problems and innovations, the national education system, education and national development, and future society.
SEDC1001	BASIC CHEMISTRY I	This course strengthens students' understanding of the following materials: classification of matter, physical and chemical properties of matter, measurement, units and unit conversion; development of atomic theory; periodic table of elements; chemical formulas, chemical equations, and types of chemical reactions; nomenclature of inorganic compounds; basic laws of chemistry; mole concept and limiting reagents; chemical bonding; solutions and their properties; introduction to redox reactions; carbon compounds; and an introduction to organic chemical reactions. This course aims to equip students with the ability to relate basic chemical concepts with other areas of chemistry, and to foster critical thinking, responsibility, and self-confidence.
SEDC1003	BASIC CHEMICAL PRACTICUM I	This course teaches the basic principles of conducting laboratory work in chemistry with accuracy, discipline, and responsibility.
SEDC1004	BASIC CHEMICAL PRACTICUM II	This course teaches the basic principles of laboratory practices related to mixture separation (sublimation, filtration, recrystallization, distillation, decantation, and centrifugation); chemical reactions; electrolyte and non-electrolyte solutions; and the amount of substance involved in chemical reactions. These activities are to be performed with accuracy, discipline, and responsibility in the chemistry laboratory.
SEDC1007	COMPUTER APPLICATION	This course aims to equip students with computer skills to support and facilitate their academic progress. Students are guided to actively understand and use computers, particularly Microsoft Office applications, to support the completion of various assignments from other courses within the scope of chemistry education. Each session consists of a short introductory lecture, discussions of real-life computer application examples, and class discussion. The course promotes mastery of the material, accuracy, responsibility, and independence.
SEDC1011	MATHEMATICS FOR CHEMISTRY	This course provides fundamental knowledge of mathematics required to solve chemistry-related problems by connecting chemistry with mathematical concepts. Students are expected to think critically, independently, and confidently in solving problems and high-order thinking skill (HOTS) questions.
SEDC1005	STOICHIOMETRY	This course aims to strengthen students' understanding of the fundamental laws of chemistry, relative atomic and molecular mass determination, mole concept, chemical reactions, redox concepts and reaction balancing, and various types of chemical calculations. Students are trained to solve problems accurately, independently, and responsibly.

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MKWU1002	CIVICS EDUCATION	This course aims to utilize learning resources and ICT-assisted instructional media to explore data/information in identifying and solving issues related to national identity and citizenship; theoretical concepts of citizenship within the context of nationhood and statehood; mindset, attitude, and behavior that reflect self-confidence, pride as Indonesian citizens and love for the homeland; and responsible behavior that characterizes a good citizen in social, national, and state life. It also covers the rights and obligations of citizens and decision-making based on theoretical concepts of civic education to address relevant societal, national, and state issues.
MKWU2001	RELIGIOUS STUDIES	This course explores the scope and identification of the creation of humans and the universe according to Islam and science; the essence of human relationships with God, fellow humans, and nature based on the Qur'anic paradigm; conceptual and/or empirical studies on the essence and urgency of Islamic spiritual values as key determinants in the development of a character-driven nation; the coherence of Islamic teachings as the implementation of Iman (faith), Islam, and Ihsan (excellence); and the internalization of istiqamah (steadfastness) in applying knowledge in daily life.
MKWU1001	PANCASILA	This course covers the emergence of Pancasila ideology; the position of Pancasila as the nation's philosophy and paradigm; Pancasila as the foundation and ideology of the state (anti-radicalism and terrorism); and Pancasila as a philosophy and ethical foundation in scientific development.
FEDU2003	PHILOSOPHY OF EDUCATION	This course requires students to explain the meaning of philosophy and its relation to education, the meaning of educational philosophy, the benefits of studying philosophy for educators, schools of philosophy and their implications for education, educational philosophy schools, Pancasila educational philosophy, Islamic educational philosophy, and the implementation of philosophical and educational philosophical values in the practice of education.
SEDC1002	BASIC CHEMISTRY II	This course strengthens students' understanding of solubility and solubility product, chemical equilibrium, acid-base theory, pH of acid-base and buffer solutions, hydrolysis, thermochemistry, reaction rate, elemental chemistry, colligative properties and colloidal systems, redox and electrochemistry, structure, nomenclature, properties, and applications of carbon compounds (haloalkanes, alkanols, alkoxy alkanes), structure, nomenclature, properties, and applications of carbon compounds (alkanals, alkanones, alkanoic acids, and alkyl alkanoates), structure, nomenclature, classification, properties, and uses of macromolecules (polymers, carbohydrates, and proteins), and structure, nomenclature, classification, properties, and applications of fats. Students are expected to think critically, confidently, and with discipline in solving given problems and exercises.
SEDC1008	CHEMICAL SOLUTIONS PRACTICUM	This course strengthens students' laboratory skills in preparing solutions with various concentration units (mole fraction, molarity, molality, normality, ppm, and ppb); performing dilutions and solution mixing; conducting standardizations; and determining solution concentrations and reagent solutions. Students are expected to conduct experiments with accuracy, discipline, independence, and responsibility.
SEDC1006	CHEMICAL SOLUTIONS	This course strengthens students' understanding of solutions, their concentrations and uses (mole fraction, molarity, molality, normality, ppm, and ppb), dilution and mixing of solutions, primary and secondary standard solutions, and concentration and reagent determination. Students are trained to perform calculations and solve problems with precision, independence, and responsibility.
SEDC1009	CHEMISTRY TEACHING MATERIAL REVIEW I	The course <i>Analysis of Chemistry Textbooks for Grade X</i> provides students with experience in analyzing Grade X Chemistry textbooks used in schools based on the Basic Competencies, and designing instructional materials such as modules, handouts, and student worksheets (LKPD). Topics include learning resources, teaching materials, scope and sequence, and the characteristics of the content. The primary reference for textbook analysis is the Ministry of Education and Culture Regulation (Permendikbud) No. 24 of 2016. The course uses various methods, including case studies, lectures, discussions, Q&A, and projects. Student performance is assessed based on assignment completion, midterm and final exam scores, and project outcomes.
SEDC1012	ICT IN CHEMISTRY LEARNING	This course aims to provide students with the knowledge and skills to utilize ICT in designing instructional media and learning resources

Code	Subject Matter (Course Name)	Description
		using computer software. Students will learn to create interactive chemistry learning media, such as acid-base titration simulations using Microsoft Excel, design molecular structures and reaction mechanisms using ChemDraw, create simple webpages using HTML, and produce animated videos using VideoScribe. Students are expected to demonstrate honesty in completing their project assignments.
SEDC1014	GASES AND THERMODYNAMICS	This course reinforces students' understanding of various forms of energy and the measurement of energy changes in chemical reactions. Students are encouraged to think critically and develop skills in solving related problems.
MKWU1004	ENGLISH	This course is offered to all new students at Syiah Kuala University to help them understand and become familiar with the TOEFL concept, which is divided into three skills: Listening, Structure, and Reading. This course is integrated with the assessment conducted by UP3BI USK.
FEDU2001	PSYCHOLOGY EDUCATION	This course aims to equip students with theoretical and practical foundations in psychology, particularly in relation to the learning process.
SEDC2001	MONOFUNCTIONAL ORGANIC CHEMISTRY	This course examines the history of organic chemistry; hydrocarbon compounds (alkanes, cycloalkanes, alkenes, alkynes, and arenes); organic compounds containing halogens (haloalkanes); oxygen-containing organic compounds (alcohols, ethers, epoxides, aldehydes, ketones, carboxylic acids, acid anhydrides, acyl halides, and esters); nitrogen-containing organic compounds (amines, amides, nitrates, nitrites, nitriles, nitro, nitroso, imines, imides, azides, cyanates, isocyanates, azo compounds); sulfur-containing organic compounds (thiols, sulfides, disulfides, sulfoxides, sulfones, sulfonic acids, sulfonic esters, thiocyanates, isothiocyanates, thials, and thioketones); and phosphorus-containing organic compounds (phosphines). The course emphasizes the structure of monofunctional groups (except alkanes and cycloalkanes), nomenclature (trivial and IUPAC), physical and chemical properties, synthesis, and applications. The course also covers isomer types and stereochemistry. Students are expected to think critically, work accurately, and demonstrate practical skills through project-based learning.
SEDC1010	CHEMISTRY TEACHING MATERIAL REVIEW II	This course requires students to examine scientific literacy aspects within Chemistry textbooks used in senior high schools (SMA/MA/SMK), and trains students to solve exercises in the textbooks independently and responsibly. Students are also expected to develop innovative instructional materials, including student worksheets (LKPD), handouts, and modules based on the textbook analysis.
SEDC2015	TEACHING AND LEARNING STRATEGY	This course guides students in developing teaching strategies as future educators with confidence and independence, based on their understanding of theories and concepts, through simulations and practical teaching experiences that reflect real classroom situations. Topics include teaching and learning strategies, learning theory, lesson planning based on strategies and models, teaching approaches and methods, stages of learning, basic teaching skills, classroom management, and enrichment and remedial instruction.
SEDC2017	CHEMICAL QUALITATIVE ANALYSIS	This course provides an understanding of the qualitative analysis of cations and anions, including their separation and the accompanying chemical reactions. Students are encouraged to think critically, work accurately, and build confidence in analyzing cations and anions.
SEDC2019	STRUCTURE AND REACTIVITY OF INORGANIC COMPOUNDS	This course provides students with knowledge of acid-base reactions and properties based on the Arrhenius, Brønsted-Lowry, and Lewis theories; the reactions and properties of hard and soft acids and bases (HSAB); classification of Lewis acids and bases and their application in the synthesis of inorganic compounds; prediction of acidity levels; and salt formation reactions. It also covers redox reactions and their applications in metal extraction and electrochemistry, distinguishing reduction and oxidation, as well as disproportionation and comproportionation reactions. Students will describe redox concepts in metal extraction using displacement, reduction methods (with C, Al, Mg, Na), and electrolysis. They will also predict redox reaction outcomes and understand redox applications in daily life and industry. Thermodynamic aspects such as metal oxide reduction, halogen oxidation, Ellingham diagrams, and the Nernst equation will also be covered. Students are expected to apply these concepts confidently and accurately.
SEDC2023	CHEMICAL AND PHASE EQUILIBRIA	This course is designed to provide students with an understanding of chemical equilibrium reactions, equilibrium constants, and the

Code	Subject Matter (Course Name)	Description
		factors affecting chemical equilibrium. Students will also gain insights into equilibrium shifts, the thermodynamics of equilibrium, and the relationship between K_c (concentration-based equilibrium constant) and K_p (gas-phase equilibrium constant). In addition, students will learn the concepts of phase equilibrium, components, degrees of freedom, and phase diagrams of various liquids. They will also understand the Clapeyron and Clausius-Clapeyron equations in the context of phase equilibrium. Students are expected to solve problems with confidence, precision, and responsibility.
SEDC2021	CHEMICAL BONDS	This course strengthens students' knowledge and understanding of atomic theory development, the beginnings of quantum theory, simple quantum mechanical systems and their applications, Huckel Molecular Orbital theory, the quantum theory of the hydrogen atom, multi-electron atoms, term symbols and orbital concepts, ionic bonding and the Born-Haber cycle, covalent bonding (valence bond Learning Theories and Chemistry Instruction and molecular orbital theory), van der Waals forces and hydrogen bonding, as well as metallic bonding and the band theory of semiconductors. Students are expected to be skilled in solving problems independently, honestly, and with discipline.
FEDU2002	CURRICULUM AND LEARNING	This course aims to provide students with holistic insight into curriculum and instruction. Students are expected to be able to translate theory into classroom practice and develop skills in selecting and developing curriculum and instructional concepts for planning and implementation in schools according to their subject area.
FEDU1002	INTRODUCTION TO EDUCATIONAL MANAGEMENT	This course requires students to examine and analyze valid, reliable, and comprehensive information and its application concerning: (1) the basic concepts of educational management, including definitions, objectives, principles, and scope; (2) educational leadership; (3) educational institution organization; (4) school-based management; (5) total quality management in education; and (6) educational supervision.
SEDC2016	CHEMICAL KINETICS	This course studies gas kinetic theory, the Maxwell-Boltzmann distribution, collision theory, and transport properties of matter to determine chemical reaction rates in elementary reactions, consecutive reactions, unimolecular reactions, and complex reactions along with their mechanisms. After completing this course, students are expected to be able to predict the time required for a chemical reaction to occur through the rate-determining step, anticipate possible mechanisms, and analyze the dynamic and energetic properties involved in various transformations.
SEDC2018	POLYFUNCTIONAL ORGANIC CHEMISTRY	This course provides an in-depth study of multifunctional organic compounds, ranging from difunctional to polyfunctional, both aliphatic and cyclic groups. It also covers various types of bicyclic, polycyclic, heterocyclic, and heteroaromatic compounds. Additionally, the course discusses biomolecules such as carbohydrates, lipids, proteins, nucleic acids, and vitamins, emphasizing their structures, nomenclature, physical and chemical properties, and applications. Students must think critically, independently, and with discipline when completing assignments and course projects.
SEDC3040	RESEARCH METHODOLOGY	This course prepares students to identify research problems, understand research methods, design research projects, develop research instruments, collect data, and write reports.
SEDC2020	EVALUATION IN CHEMISTRY TEACHING	This course provides an understanding of the goals, functions, and essence of instructional evaluation. Students will learn to develop assessment instruments for knowledge, attitudes, and skills; implement authentic assessments; analyze test items qualitatively and quantitatively; and prepare learning outcome reports. All assignments must be completed with responsibility, independence, accuracy, and punctuality.
SEDC2022	MAIN GROUP ELEMENTS AND COMPOUNDS	This course aims to provide students with an understanding of the physical and chemical properties, extraction/production processes, and applications of the elements and their compounds from the main group elements, namely hydrogen and groups 1, 2, 13, 14, 15, 16, 17, and 18. Assignments are given to foster independence, accuracy, and critical thinking skills.
SEDC2024	CHEMICAL QUANTITATIVE	This course reinforces students' understanding of quantitative analytical methods: gravimetric and volumetric analysis; neutralization titration; precipitation titration (Mohr, Volhard, and Fajans methods); redox titration; and complexometric titration, along with some of

Code	Subject Matter	Description
	(Course Name)	
	ANALYSIS	their applications. Case study assignments and projects are provided to train students' skills and independence.
FEDU2004	PROFESSION OF EDUCATION	This course provides a comprehensive understanding of the concepts of the teaching profession and equips students with strategies for sustainable professional development as teachers, conducted independently and responsibly.
FEDUP002	SCHOOL INTERNSHIP	This course aims to strengthen students' academic and subject-specific competencies through various school-based activities. The PLP covers all teacher duties, including academic tasks (curricular, co-curricular, and extracurricular) and non-academic responsibilities (administrative and social).
SEDC2026	CHEMISTRY TEACHING PLAN	This course guides students in developing instructional tools as preparation for future teaching responsibilities. The developed tools are compiled into a complete written report. As future teachers, students are also required to develop interactive and innovative media, create instructional materials suited to student characteristics, and design assessment instruments for cognitive, affective, and psychomotor domains. The learning tools, developed for Grades X, XI, and XII, include the calculation of effective weeks, Annual Program, Competency Achievement Indicators (IPK), Semester Program, Syllabus, Lesson Plans (RPP), Minimum Completeness Criteria (KKM), teaching materials, media, and assessment instruments. At the end of the course, students must submit a project report to enhance their skills, independence, accuracy, discipline, and responsibility as prospective teachers.
SEDC3027	FUNDAMENTALS OF CHEMICAL SEPARATIONS	This course explains the principles of physical and chemical separation in chemistry, including distillation, fractional distillation, low-pressure distillation, liquid-liquid extraction, solid-liquid extraction, column chromatography, ion exchange chromatography, gel chromatography, HPLC, planar chromatography, gas chromatography, and electrophoresis. Project-based assignments are provided to train students in report writing.
SEDC3029	STATISTICS	This course clarifies the basic concepts of applied statistics to meet the needs of education in general and specifically in chemistry education. It is expected to offer practical solutions for students when writing scientific papers (theses). The lecture content focuses on: basic statistical concepts, data, data presentation, creating frequency distribution tables, measures of central tendency, data dispersion, sampling, and hypothesis testing using t-tests, correlation, simple regression, and ANOVA. At the end of the course, students will be introduced to free data processing software. Assignments are designed to foster critical thinking and discipline.
SEDC3031	TRANSITION ELEMENTS AND COORDINATION CHEMISTRY	This course strengthens students' understanding of the physical and chemical properties of transition elements; their extraction and applications; properties of transition metal compounds; synthesis techniques and uses of these compounds; valence bond theory, crystal field theory, and ligand field theory; nomenclature of coordination compounds; types of ligands and their applications in synthesis; reactions of coordination compounds; stability, kinetics, and reaction mechanisms of coordination compounds; geometries and applications of coordination compounds; and developments in coordination chemistry. Project-based assignments are given to train students' skills and independence.
SEDC3037	ANALYTICAL CHEMISTRY PRACTICUM	This course aims to equip students with the ability to operate the UV/Vis spectrophotometer for measuring the concentration of metal ions in single or mixed sample solutions, determine the pKa value of an indicator using UV/Vis spectrophotometry, and proficiently use separation tools such as a separatory funnel, Soxhlet extractor, and column chromatography to isolate compounds in mixtures or food colorants.
SEDC2028	PHYSICAL CHEMISTRY PRACTICUM	This course is designed to provide students with skills to conduct and develop experiments related to thermodynamic properties, chemical kinetics, physical properties of materials, and accurate measurements of various forms of energy with independence, confidence, and discipline.
SEDC3035	ORGANIC CHEMISTRY PRACTICUM	This course aims to strengthen students' understanding of the fundamental concepts in organic chemistry laboratory practices, focusing on the identification of configurations, functional groups, and secondary metabolites in organic compounds. These include notations: (D and L), (R and S), (E and Z), (cis and trans); functional groups: alkenes, alcohols, aldehydes, ketones, phenols, aromatics, and amines; and

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		secondary metabolite groups such as alkaloids, tannins, polyphenols, quinones, flavonoids, saponins, triterpenoids, and steroids. The course emphasizes skill development, precision, and student independence.
SEDC3033	ORGANIC REACTIONS	This course provides an in-depth discussion on the concepts of bond cleavage and formation in organic compounds, and the mechanisms of organic reactions including oxidation, reduction, electrophilic substitution in aliphatic, cyclic, and aromatic structures, nucleophilic substitution in aromatic compounds, unimolecular (SN1) and bimolecular (SN2) nucleophilic substitutions, eliminations, radical reactions, additions, and pericyclic reactions, with emphasis on their mechanisms. Students are trained to complete project tasks independently.
FEDUP001	MICRO TEACHING	This course develops students' practical teaching skills through limited teaching practice or simulations conducted independently and confidently in a microteaching laboratory.
MKWUP001	COMMUNITY SERVICE PROGRAM	This course is designed to provide students with experience in preparing activity proposals that are tailored to the conditions and needs of local villages, and in compiling the corresponding implementation reports.
SEDC3032	INSTRUMENTAL CHEMICAL ANALYSIS	This course reinforces students' understanding of various instruments and their applications for quantitative analysis, including: UV/Vis spectrophotometry, infrared spectrometry, atomic absorption spectroscopy, atomic emission spectroscopy, and nuclear magnetic resonance spectroscopy, with an emphasis on critical thinking.
SEDC3041	BIOCHEMISTRY PRACTICUM	This course teaches laboratory techniques for analyzing compounds related to proteins, carbohydrates, and fats, accompanied by experiments on enzyme performance. Practical work is designed to develop students' skills, accuracy, independence, discipline, and responsibility.
SEDC3039	BIOCHEMISTRY	This course introduces students to how the body's metabolism is regulated and explores the biochemical processes in the body through collaboration, critical thinking, and confidence.
SEDC3034	INORGANIC CHEMISTRY PRACTICUM	The Inorganic Chemistry Laboratory course is designed to provide students with an understanding and skills in synthesizing compounds from their elements, producing or extracting elements from compounds, and investigating the properties of inorganic elements and compounds, including coordination compounds, through collaboration, creativity, and responsibility.
SEDC3036	LABORATORY MANAGEMENT	The Laboratory Management course is designed to equip students with knowledge and skills in managing laboratory administration as well as chemical and scientific apparatus and materials in school laboratories. Topics include laboratory managerial knowledge, handling of instruments and materials, hazardous waste management, laboratory safety, introduction to instruments, and equipment calibration.
SEDC2025	CHEMISTRY TEACHING MATERIAL REVIEW III	This course involves several key activities. First, students and lecturers will discuss the scope and sequence of Grade XII high school chemistry content. Second, students will examine the nature and causes of misconceptions. Third, students and lecturers will analyze misconceptions in several chemistry topics, including: (1) Colligative Properties of Solutions; (2) Redox Reactions and Electrochemistry; (3) Chemical Elements (Abundance in Nature, Physical and Chemical Properties, Production of Elements and Compounds); (4) Carbon Compounds (Structure, Nomenclature, Properties, Identification, and Applications); and (5) Macromolecules (Structure, Nomenclature, Properties, Applications, and Classification of Polymers, Carbohydrates, Proteins, and Lipids). Fourth, students will solve and analyze high school chemistry problems. Fifth, students will independently develop teaching materials such as modules, handouts, and student worksheets (LKPD) based on the analysis, with creativity, accuracy, and independence.
SEDC3043	APPLIED CHEMISTRY	This course equips students with the ability to identify chemical concepts that can be applied in schools to develop products beneficial to society, with a sense of independence and responsibility.
SEDC3038	MOLECULAR SPECTROSCOPY	The Molecular Spectroscopy course provides students with an understanding of techniques used to identify organic and inorganic compounds at the molecular level. When a beam of light with a certain wavelength interacts with a molecule, it undergoes various reactions such as rotation, vibration, and electronic excitation. These principles are utilized in chemistry to determine molecular

Code	Subject Matter	Description
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		characteristics, including molecular shape, functional groups, and qualitatively estimating the number of atoms in a molecule. This spectroscopy is widely used for identifying organic, inorganic, and biochemical species. Students are trained to be confident, independent, and creative.
SEDC3030	CHEMISTRY SEMINAR	This course aims to provide students with knowledge of the stages of scientific research in the field of chemistry, starting from selecting research topics (based on literature reviews, experiences, community complaints, etc.), conducting further literature reviews, writing research proposals, executing research, writing articles, and presenting research findings.
FEDUPA01	SCRIPT	This course provides students with experience in conducting research and writing scientific papers or research reports under supervision, with the final results defended in a thesis examination.
SEDC6045	REVIEW OF VALUES IN CHEMISTRY LEARNING	This course examines the following topics: (1) The nature of values and value education (definitions of values, morals, ethics, character; the relationship between value education and character education; factors influencing character value education and stages of character value development); (2) The importance of value education in chemistry teaching (Value Classification; Analysis of Values in Chemistry Content; Mapping of Values in Chemistry Content; Integration of Value Education in Chemistry Learning); (3) Strategies for teaching value-laden chemistry: Chemistry Curriculum with Embedded Values; Development of Value-Laden Chemistry Learning Models, Instructional Media, and Evaluation.
SEDC6047	POLYMER CHEMISTRY	This course strengthens students' knowledge of the fundamentals of molecular spectroscopy, rotational spectra, vibrational-rotational spectra of diatomic molecules, fundamentals of photochemistry, molecular symmetry, and point groups with independence and confidence.
SEDC6049	FOOD CHEMISTRY	This course provides an in-depth discussion of both natural and synthetic chemical compounds related to food components including water, ice, lipids, proteins, carbohydrates, vitamins, and minerals, covering their sources, types, functions, and impacts of deficiency or excess. It also includes discussions on food additives such as colorants, flavorings, additives, and toxic substances found in food. Project tasks are completed collaboratively and creatively.
SEDC6046	ELECTROANALYTICAL CHEMISTRY	This course is designed to provide students of chemistry education with an understanding of basic electrochemistry concepts, including knowledge of electrochemical cells and electrolysis cells as well as the application of dry and wet cells in various fields, such as batteries, accumulators, polymer batteries, and fuel cells. It also covers applications in chemical instrumentation, such as pH meters, potentiometers, and electro-organic synthesis. Students are encouraged to think critically and creatively in preparing reports, and to work with discipline.
SEDC2019	STRUCTURE DETERMINATION OF ORGANIC COMPOUNDS	This course discusses concepts of UV-Vis spectrophotometry: instrumentation, absorption spectra, and the use of UV-Vis spectra in determining molecular structure; infrared spectrophotometry: instrumentation, IR spectral patterns, frequency absorption, fingerprint regions, and spectral interpretation; mass spectrometry: instrumentation, mass spectra, molecular ions, fragmentation, and the use of mass spectra to differentiate compounds; nuclear magnetic resonance spectrometry: instrumentation, ¹ H and ¹³ C chemical shifts, and spectral interpretation. Students are expected to think critically and creatively in completing assigned project tasks.
SEDC6059	CHEMISTRY LEARNING MEDIA	The Chemistry Learning Media course is designed to provide students with the understanding and skills to utilize various chemistry learning media, especially digital-based media, to innovate in creating learning media or visual aids from surrounding environments, and to design and use internet-based learning resources to support chemistry instruction in schools.
SEDC6061	INDUSTRIAL INORGANIC CHEMISTRY	This course is designed to help students understand the roles of inorganic compounds in major industries through the analysis of case studies related to environmental pollution and mitigation efforts.
SEDCP619	RADIOCHEMISTRY	This course is provided to strengthen students' understanding of atomic structure concepts, nuclear composition and properties related to radioactivity, mass systematics, binding energy, nuclear forces, and stability. Topics include radioactive decay processes and half-life,

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		alpha, beta, and gamma radiation, exponential decay, independent dual activity decay, sequential decay, branching decay, nuclear transformation equations, interaction of radiation with matter (including positive ions, electrons, gamma rays, and neutrons), labeling methods with radioactive materials, isotopic effects, tracer kinetics, and applications of radiochemistry in analytical chemistry. Additional topics include radiometric analysis, isotope dilution analysis, neutron activation analysis, chemical effects of nuclear transformations, medical applications, positron imaging, radiopharmaceuticals, radioimmunoassays, short-lived radionuclide generators, and artificially produced elements. Students are expected to engage with confidence, independence, and discipline.
SEDC6065	ACTION RESEARCH	This course guides students to understand the nature and characteristics of action research, research problems, action research cycles, action planning, implementation, observation, and reflection; developing action research instruments; data interpretation and analysis; and preparing action research reports.
SEDC6067	CHEMISTRY LEARNING PROBLEMS REVIEW	The Chemistry Learning Problem Analysis course provides experience in analyzing problems encountered in chemistry education, including learning outcomes, instructional media, teaching strategies, learning materials, or laboratory issues. Through this course, students learn to find solutions to identified problems. Problem identification may be done through literature review or school surveys. The course employs various methods such as lectures, discussions, Q&A sessions, and case studies. Student success is evaluated through assignments, midterm and final exams, and case study reports.
SEDC6069	MINERALOGY	This course aims to strengthen students' understanding of minerals in terms of both chemical and physical properties. It also covers crystal lattices and their determination, crystal structures and systems, types of minerals classified by their anions, and the types of rocks found in nature. Students are expected to engage independently, carefully, and confidently.
SEDC6073	VALIDATION OF INSTRUMENTAL ANALYTICAL METHODS	This course is designed to equip students and laboratory personnel with the knowledge to perform method validation based on the International Standard ISO/IEC 17025. Focus topics include validation and verification parameters such as precision, accuracy, linearity and working range, limit of detection (LOD) and limit of quantification (LOQ), recovery, robustness and ruggedness of test methods, measurement uncertainty estimation, and practical applications in UV/Vis, HPLC, AAS, and ICP-AES.
SEDC6075	SCHOOL CHEMISTRY EXPERIMENTS	This course provides reinforcement of knowledge and skills related to chemistry experiments that demonstrate or verify chemical concepts, as well as methods for conducting effective and engaging experiments in schools even under conditions of limited or unavailable chemistry laboratories.
SEDC6077	ENVIRONMENTAL CHEMISTRY	This course provides an in-depth discussion of introductory environmental chemistry; the environment and its problems; chemistry and the environment; chemicals in the environment; chemical transformation processes in the environment; water and biogeochemical cycles; environmental sanitation; air, water, and soil pollution; CPLbal environmental issues including the greenhouse effect, ozone layer depletion, acid rain, and hazardous and toxic waste (B3). Students are directed to complete projects independently and carefully.
SEDC6079	BIOTECHNOLOGY	This course aims to reinforce understanding of the definition, history, and development of biotechnology; its applications in food, agriculture, livestock, medicine, and the environment; as well as the positive and negative impacts of biotechnology, and the treatment of waste through biotechnological processes.
SEDC6081	SOLOIDS AND SURFACE CHEMISTRY	This course is designed to provide advanced understanding to students regarding the properties of liquids and solids, types of crystals, crystal lattices, and surface adsorption of chemical substances. Understanding the structure of solids through various existing models helps in predicting the properties of a solid material. Moreover, modifying the components of a solid substance can lead to the development of materials with beneficial applications in fields such as ceramics, alloys, and semiconductors. In the surface tension section, students are expected to comprehend the surface tension of liquids, the Kelvin equation, Gibbs adsorption, and adsorption isotherms relevant to heterogeneous catalytic applications in chemical synthesis. This course strengthens students' knowledge on liquid surface tension and its measurement, surface area of solids, as well as the structure and properties of crystalline solids.
SEDC6048	BIOINORGANIC	This course is designed to provide students with an understanding of the role of metal minerals in biological systems within the context

Code	Subject Matter (Course Name)	Description
		of diseases, deficiencies, and toxicities, as well as the role of inorganic compounds (including coordination compounds) in the medical field. This includes efforts to comprehend the diagnosis and therapy of popular diseases, delivered through individual and group assignments.
SEDC6085	ORGANIC CHEMISTRY NATURAL RESOURCE	This course discusses the concept of metabolism, biosynthetic pathways of secondary metabolites, and their classifications, including isoprenoids, alkaloids, phenolics, glycosides, peptides, and polyketides. The course material is structured in tabular form to facilitate students in identifying molecular structural features, source organisms of the metabolites, and their associated bioactivities.
SEDC3042	CHEMISTRY ENTREPRENEURSHIP	This course is designed to cultivate entrepreneurial interest and prepare students to face real-world challenges in business and industry. It encourages chemistry education students to utilize their chemical knowledge to design entrepreneurial products based on chemical transformation with added economic value. The course also promotes the use of information technology for product design, branding, and marketing. Students are encouraged to start small businesses and use platforms such as Kedaireka, Shopee, and Bukalapak to market products and services. Social responsibility and empathy to improve community welfare by utilizing local natural resources are also emphasized.
SEDC3044	CHEMISTRY ENTREPRENEURSHIP PRACTICE	This course is designed to provide students with practical experience in integrating the principles of chemistry with entrepreneurship. Through a project-based learning approach, students will learn to design, develop, and produce innovative products in the form of goods or services that are safe, beneficial, and economically valuable. During the learning process, students will apply chemical concepts creatively and responsibly, while upholding the principles of honesty, accuracy, and sustainability for the welfare of society. In addition, this course promotes the development of entrepreneurial skills such as identifying business opportunities, production planning, resource management, and marketing strategies. Through hands-on activities and direct evaluations, students are expected to produce products that not only meet safety and quality standards but also possess market competitiveness. This course provides an essential foundation for students to become professional and ethical chemistry-based entrepreneurs.
SEDC6050	STEAMC IN CHEMISTRY	This course introduces students to integrated learning approaches that broaden perspectives on real-world problems. It aims to encourage students to solve problems by connecting elements of Science, Technology, Engineering, Art, and Mathematics (STEAM).
SEDC6052	INNOVATIVE LEARNING DESIGN	This course enables students to develop innovative learning based on knowledge of models, approaches, and methods that align with 21st-century learning characteristics. Students will also be equipped to develop learning resources that support innovative teaching practices.
SEDC6054	CHEMISTRY OF ESSENTIAL OILS	This course provides in-depth discussions on essential oils, including their definitions, uses, isolation methods, analytical techniques, and chemical component identification. It also covers plant sources, production, quality, and chemical composition of essential oils, and focuses on the modification of key components from patchouli, citronella, ylang-ylang, galangal, fennel, nutmeg, CPMKve/lawang, turpentine, vetiver, peppermint, cajuput/cinnamon, and sandalwood/agarwood.
SEDC6057	CHEMISTRY OF WASTE MANAGEMENT	This course explores the concepts of waste, types and sources of waste, waste collection, segregation, storage, and transportation. It covers the management of plastic waste (non-biodegradable and bioplastics), inorganic waste (metals and construction debris), and organic waste (compost, biogas, biochar, biopesticides, briquettes, activated charcoal). The course aims to cultivate environmental awareness and critical thinking.
SEDC6058	VIRTUAL CHEMISTRY	This course provides students with an understanding of the urgency, advantages, and benefits of using virtual chemistry in teaching. Upon completion, students are expected to design and conduct school laboratory experiments using various online virtual chemistry sources, analyze needs, and select appropriate VLab applications for both basic and advanced experiments in chemistry education.
SEDC6053	GREEN CHEMISTRY	This course focuses on analyzing issues and literature to enable students to understand the principles of green chemistry in minimizing

Code	Subject Matter	Description
	(Course Name)	
		environmental impact from chemical activities.
SEDC6055	FORENSIC CHEMISTRY	This course provides knowledge on how to interpret meaningful analytical/forensic data derived from criminal evidence by analyzing principles, theories, and chemical technologies applied in forensic laboratories.
SEDC6071	MICROBIAL CHEMISTRY	This course offers an understanding of cell communication mechanisms in bacteria, plants, and animals, including the types of chemical compounds used in intercellular communication and the concept of quorum sensing. It aims to equip students with skills to apply microbial chemical knowledge in daily life.
SEDC6056	INDUSTRIAL BIOCHEMISTRY	This course aims to provide an understanding of the industrialization of biochemical and biotechnological products. It introduces companies such as Biofarma and PT Paragon, their products, job opportunities, and encourages students to apply their knowledge of industrial biochemistry in practical settings.
SEDC6051	TEACHING AND LEARNING THEORIES IN CHEMISTRY	This course strengthens students' understanding of established learning theories. It focuses on four major learning theories: behaviorism, cognitivism, social cognitive theory, and constructivism. Students will also discuss research findings and applications of these theories in chemistry education. A project assignment is given to foster student independence.

2.1. Curriculum Structure

Table 3.8. List of Courses

Semester I / Odd Semester							
No	Code	Course	SKS	T	P	Category	Prerequisite
1	MKWU1001	PANCASILA	2	2	0	W	
2	MKWU1003	INDONESIAN LANGUAGE	2	2	0	W	
3	MKWU1005	DISASTER AND ENVIRONMENTAL STUDIES	2	2	0	W	
5	MKWU1006	CHARACTER BUILDING 1	0	0	0	W	
6	FEDU1001	FUNDAMENTAL OF EDUCATION	2	2	0	W	
7	SEDC1001	BASIC CHEMISTRY I	3	3	0	W	
8	SEDC1003	BASIC CHEMICAL PRACTICUM I	1	0	1	W	
9	SEDC1005	STOICHIOMETRY	2	2	0	W	
10	SEDC1007	COMPUTER APPLICATION	2	2	0	W	
11	SEDC1009	CHEMISTRY TEACHING MATERIAL REVIEW I	2	2	0	W	
12	SEDC1011	MATHEMATICS FOR CHEMISTRY	2	2	0	W	
TOTAL			20	19	1		
Semester II / Even Semester							
No	Code	Course	SKS	T	P	Category	Prerequisite
1	MKWU1002	CIVICS EDUCATION	2	2	0	W	
2	MKWU1004	ENGLISH	2	2	0	W	
3	FEDU1002	INTRODUCTION TO EDUCATIONAL MANAGEMENT	2	2	0	W	
4	MKWU1006	CHARACTER BUILDING 2	0	0	0	W	
5	SEDC1002	BASIC CHEMISTRY II	2	2	0	W	
6	SEDC1004	BASIC CHEMICAL PRACTICUM II	1	0	1	W	
7	SEDC1006	CHEMICAL SOLUTIONS	2	2	0	W	
8	SEDC1008	CHEMICAL SOLUTIONS PRACTICUM	1	0	1	W	
9	SEDC1010	CHEMISTRY TEACHING MATERIAL REVIEW II	2	2	0	W	
10	SEDC1012	ICT IN CHEMISTRY LEARNING	3	3	0	W	
11	SEDC1014	GASES AND THERMODYNAMICS	2	2	0	W	
TOTAL			19	17	2		
Semester III / Odd Semester							
No	Code	Course	SKS	T	P	Category	Prerequisite
1	MKWU2001	RELIGIOUS STUDIES	2	2	0	W	

2	FEDU2001	PSYCHOLOGY EDUCATION	2	2	0	W	
3	SEDC2001	MONOFUNCTIONAL ORGANIC CHEMISTRY	3	3	0	W	
4	SEDC2015	TEACHING AND LEARNING STRATEGY	3	3	0	W	
5	SEDC2017	CHEMICAL QUALITATIVE ANALYSIS	2	2	0	W	
6	SEDC2019	STRUCTURE AND REACTIVITY OF INORGANIC COMPOUNDS	3	3	0	W	
7	SEDC2021	CHEMICAL BONDS	3	3	0	W	
8	SEDC2023	CHEMICAL AND PHASE EQUILIBRIA	2	2	0	W	
9	SEDC2025	CHEMISTRY TEACHING MATERIAL REVIEW III	2	2	0	W	
TOTAL			22	22	0		

Semester IV / Even Semester							
No	Code	Course	SKS	T	P	Category	Prerequisite
1	FEDU2002	CURRICULUM AND LEARNING	2	2	0	W	
2	FEDU2003	PHILOSOPHY EDUCATION	2	2	0	W	
3	SEDC2016	CHEMICAL KINETICS	3	3	0	W	
4	SEDC2018	POLYFUNCTIONAL ORGANIC CHEMISTRY	3	3	0	W	
5	SEDC2020	EVALUATION IN CHEMISTRY TEACHING	3	3	0	W	
6	SEDC2022	MAIN GROUP ELEMENTS AND COMPOUNDS	3	3	0	W	
7	SEDC2024	CHEMICAL QUANTITATIVE ANALYSIS	2	2	0	W	
8	SEDC2026	CHEMISTRY TEACHING PLAN	3	3	0	W	
9	SEDC2028	PHYSICAL CHEMISTRY PRACTICUM	2	0	2	W	
TOTAL			23	21	2		

Semester V / Odd Semester							
No	Code	Course	SKS	T	P	Category	Prerequisite
1	FEDU2004	PROFESSION OF EDUCATION	2	2	0	W	
2	SEDC3027	FUNDAMENTALS OF CHEMICAL SEPARATIONS	2	2	0	W	
3	SEDC3029	STATISTICS	2	2	0	W	
4	SEDC3031	TRANSITION ELEMENTS AND COORDINATION CHEMISTRY	2	2	0	W	
5	SEDC3033	ORGANIC REACTIONS	2	2	0	W	
6	SEDC3035	ORGANIC CHEMISTRY PRACTICUM	2	0	2	W	
7	SEDC3037	ANALYTICAL CHEMISTRY PRACTICUM	2	0	2	W	
8	SEDC3039	BIOCHEMISTRY	2	2	0	W	
9	SEDC3041	BIOCHEMISTRY PRACTICUM	1	0	1	W	

10	SEDC3043	APPLIED CHEMISTRY	2	2	0	W	
11		ELECTIVE COURSE 1*	2	2	0	P	
12		ELECTIVE COURSE 2*	2	2	0	P	
TOTAL			23	18	5		
Semester VI / Even Semester							
No	Code	Course	SKS	T	P	Category	Prerequisite
1	FEDUP001	MICRO TEACHING	3	0	3	W	
2	SEDC3030	CHEMISTRY SEMINAR	2	0	2	W	
3	SEDC3032	INSTRUMENTAL CHEMICAL ANALYSIS	2	2	0	W	
4	SEDC3034	INORGANIC CHEMISTRY PRACTICUM	2	0	2	W	
5	SEDC3036	LABORATORY MANAGEMENT	2	2	0	W	
6	SEDC3038	MOLECULAR SPECTROSCOPY	2	2	0	W	
7	SEDC3040	RESEARCH METHODOLOGY	2	2	0	W	
8	SEDC3042	CHEMISTRY ENTREPRENEURSHIP	2	2	0	W	
9	SEDC3044	CHEMISTRY ENTREPRENEURSHIP PRACTICE	1	0	1	W	
10		ELECTIVE COURSE 1*	2	2	0	P	
11		ELECTIVE COURSE 2*	2	2	0	P	
TOTAL			22	14	8		
Semester VII / Odd Semester							
No	Code	Course	SKS	T	P	Category	Prerequisite
1	FEDUP002	SCHOOL INTERNSHIP	4	0	4	W	
2	MKWUP001	COMMUNITY SERVICE PROGRAM	2	0	2	W	
3		ELECTIVE COURSE 1*	2	2	0	P	
4		ELECTIVE COURSE 2*	2	2	0	P	
TOTAL			10	4	6		
Semester VIII / Even Semester							
No	Code	Course	SKS	T	P	Category	Prerequisite
1	FEDUPA01	SCRIPT	4	0	4	W	
2		ELECTIVE COURSE 1*	2	2	0	P	
3		ELECTIVE COURSE 2*	2	2	0	P	
TOTAL			8	4	4		
TOTAL SKS			147	119	28		
List of Elective Courses in the Semester							

No	Code	Course	SKS	T	P	Category	Prerequisite
Semester V / Odd Semester							
1	SEDC6045	REVIEW OF VALUES IN CHEMISTRY LEARNING	2	2	0	P	
2	SEDC6047	POLYMER CHEMISTRY	2	2	0	P	
3	SEDC6049	FOOD CHEMISTRY	2	2	0	P	
4	SEDC6051	TEACHING AND LEARNING THEORIES IN CHEMISTRY	2	2	0	P	
5	SEDC6053	GREEN CHEMISTRY	2	2	0	P	
6	SEDC6055	FORENSIC CHEMISTRY	2	2	0	P	
7	SEDC6057	CHEMISTRY OF WASTE MANAGEMENT	2	2	0	P	
Semester VI / Even Semester							
1	SEDC6046	ELECTROANALYTICAL CHEMISTRY	2	2	0	P	
2	SEDC2019	STRUCTURE DETERMINATION OF ORGANIC COMPOUNDS	2	2	0	P	
3	SEDC6050	STEAMC IN CHEMISTRY	2	2	0	P	
4	SEDC6052	INNOVATIVE LEARNING DESIGN	2	2	0	P	
5	SEDC6054	CHEMISTRY OF ESSENTIAL OILS	2	2	0	P	
6	SEDC6056	INDUSTRIAL BIOCHEMISTRY	2	2	0	P	
7	SEDC6058	VIRTUAL CHEMISTRY	2	2	0	P	
Semester VII / Odd Semester							
1	SEDC6059	CHEMISTRY LEARNING MEDIA	2	2	0	P	
2	SEDC6061	INDUSTRIAL INORGANIC CHEMISTRY	2	2	0	P	
3	SEDCP619	RADIOKIMIA	2	2	0	P	
4	SEDC6065	ACTION RESEARCH	2	2	0	P	
5	SEDC6067	CHEMISTRY LEARNING PROBLEMS REVIEW	2	2	0	P	
6	SEDCP625	SEDC6069	2	2	0	P	
7	SEDC6071	MICROBIAL CHEMISTRY	2	2	0	P	
Semester VIII / Even Semester							
1	SEDC6073	VALIDATION OF INSTRUMENTAL ANALYTICAL METHODS	2	2	0	P	
2	SEDC6075	SCHOOL CHEMISTRY EXPERIMENTS	2	2	0	P	
3	SEDC6077	ENVIRONMENTAL CHEMISTRY	2	2	0	P	
4	SEDC6079	BIOTECHNOLOGY	2	2	0	P	
5	SEDC6081	SOLOIDS AND SURFACE CHEMISTRY	2	2	0	P	
6	SEDC6048	BIOINORGANIC	2	2	0	P	
7	SEDCP628	NATURAL PRODUCTS ORGANIC CHEMISTRY	2	2	0	P	

Note: W = Mata Kuliah Wajib (Compulsory Course); P = Mata Kuliah Pilihan (Elective Course)

2.2. Summary

Table 3.9. General Information on Subject Matter

General Information	SKS
Minimum total credits required for graduation	147
Number of elective courses that must be taken	16
Total number of elective courses offered	28
Number of General Courses (MKWU) components	18
Number of skill-based course components	30
Number of Basic Science Course components	35
Number of Subject-Specific/Expertise Course components	111
Number of curricular/extracurricular activities supporting innovation, entrepreneurship, and IT skills	11
Course components aligned with the SDGs vision	187

Table 3.10. Characteristics of Elective Courses

No	Code	Course	SKS	Characteristics (√)						
				A	B	C	D	E	F	G
1	SEDC6045	REVIEW OF VALUES IN CHEMISTRY LEARNING	2	√	√	√		√	√	
2	SEDC6047	POLYMER CHEMISTRY	2	√	√		√		√	
3	SEDC6049	FOOD CHEMISTRY	2	√	√		√		√	
4	SEDC6046	ELECTROANALYTICAL CHEMISTRY	2	√	√	√	√	√	√	
5	SEDC2019	STRUCTURE DETERMINATION OF ORGANIC COMPOUNDS	2	√	√	√		√	√	
6	SEDC6059	CHEMISTRY LEARNING MEDIA	2	√	√	√	√		√	
7	SEDC6061	INDUSTRIAL INORGANIC CHEMISTRY	2	√	√			√	√	
8	SEDC6063	RADIOCHEMISTRY	2	√	√				√	
9	SEDC6065	ACTION RESEARCH	2	√	√	√		√	√	
10	SEDC6067	CHEMISTRY LEARNING PROBLEMS REVIEW	2	√	√			√	√	
11	SEDC6069	MINERALOGY	2	√	√				√	
12	SEDC6073	VALIDATION OF INSTRUMENTAL ANALYTICAL METHODS	2	√	√			√	√	
13	SEDC6075	SCHOOL CHEMISTRY EXPERIMENTS	2	√	√	√	√	√	√	
14	SEDC6077	ENVIRONMENTAL CHEMISTRY	2	√	√		√	√	√	
15	SEDC6079	BIOTECHNOLOGY	2	√	√	√	√	√	√	
16	SEDC6081	SOLOIDS AND SURFACE CHEMISTRY	2	√	√				√	
17	SEDC6048	BIOINORGANIC	2	√	√			√	√	
18	SEDC6085	ORGANIC CHEMISTRY NATURAL RESOURCE	2	√	√		√	√	√	
19	SEDC6050	STEAMC IN CHEMISTRY	2	√	√	√	√	√	√	

No	Code	Course	SKS	Characteristics (✓)						
				A	B	C	D	E	F	G
20	SEDC6052	INNOVATIVE LEARNING DESIGN	2	✓	✓	✓		✓	✓	
21	SEDC6054	CHEMISTRY OF ESSENTIAL OILS	2	✓	✓		✓	✓	✓	
22	SEDC6057	CHEMISTRY OF WASTE MANAGEMENT	2	✓	✓		✓	✓	✓	
23	SEDC6058	VIRTUAL CHEMISTRY	2	✓	✓	✓	✓	✓	✓	
24	SEDC6053	GREEN CHEMISTRY	2	✓	✓	✓	✓	✓	✓	
25	SEDC6055	FORENSIC CHEMISTRY	2	✓	✓	✓		✓	✓	
26	SEDC6071	MICROBIAL CHEMISTRY	2	✓	✓	✓		✓	✓	
27	SEDC6056	INDUSTRIAL BIOCHEMISTRY	2	✓	✓	✓	✓	✓	✓	
28	SEDC6051	TEACHING AND LEARNING THEORIES IN CHEMISTRY	2	✓	✓	✓		✓	✓	

A = Deepens academic knowledge

B = Enhances skills/professionalism for the workforce

C = Improves IT skills

D = Encourages entrepreneurship

E = Develops soft skills

F = Can be converted into MBKM (Independent Learning – Independent Campus) activities

G = Others

T = Tutorial

P = Practical session

Table 3.11. List of Courses Related to the Implementation of SDGs, PBR, PjBL, Case-M, and/or MBKM

No	Code	Course	SKS	Category	SDGs Target	Remarks			
						R B L	Pj BL	Case-M	MBKM
1	MKWU1003	INDONESIAN LANGUAGE	2	W	4				
2	MKWU1005	DISASTER AND ENVIRONMENTAL STUDIES	2	W	4			✓	
3	FEDU1001	FUNDAMENTAL OF EDUCATION	2	W	4			✓	
4	SEDC1001	BASIC CHEMISTRY I	3	W	4			✓	
5	SEDC1003	BASIC CHEMICAL PRACTICUM I	1	W	4		✓		
6	SEDC1004	BASIC CHEMICAL PRACTICUM II	1	W	4		✓		
7	SEDC1007	COMPUTER APPLICATION	2	W	4		✓		
8	SEDC1011	MATHEMATICS FOR CHEMISTRY	2	W	4			✓	
9	SEDC1005	STOICHIOMETRY	2	W	4			✓	
10	MKWU1002	CIVICS EDUCATION	2	W	4			✓	
11	MKWU2001	RELIGIOUS STUDIES	2	W	4			✓	
12	MKWU1001	PANCASILA	2	W	4			✓	
13	FEDU2003	PHILOSOPHY OF EDUCATION	2	W	4			✓	
14	SEDC1002	BASIC CHEMISTRY II	2	W	4			✓	

No	Code	Course	SKS	Category	SDGs Target	Remarks			
						R B L	Pj BL	Case-M	MBKM
15	SEDC1008	CHEMICAL SOLUTIONS PRACTICUM	1	W	4		√		
16	SEDC1006	CHEMICAL SOLUTIONS	2	W	4			√	
17	SEDC1009	CHEMISTRY TEACHING MATERIAL REVIEW I	2	W	4		√		
18	SEDC1012	ICT IN CHEMISTRY LEARNING	3	W	4		√		
19	SEDC1014	GASES AND THERMODYNAMICS	2	W	4			√	
20	MKWU1004	ENGLISH	2	W	4			√	
21	FEDU2001	PSYCHOLOGY EDUCATION	2	W	4			√	
22	SEDC2001	MONOFUNCTIONAL ORGANIC CHEMISTRY	3	W	4			√	
23	SEDC1010	CHEMISTRY TEACHING MATERIAL REVIEW II	2	W	4		√		
24	SEDC2015	TEACHING AND LEARNING STRATEGY	3	W	4			√	
25	SEDC2017	CHEMICAL QUALITATIVE ANALYSIS	2	W	4			√	
26	SEDC2019	STRUCTURE AND REACTIVITY OF INORGANIC COMPOUNDS	3	W	4			√	
27	SEDC2023	CHEMICAL AND PHASE EQUILIBRIA	2	W	4			√	
28	SEDC2021	CHEMICAL BONDS	3	W	4			√	
29	FEDU2002	CURRICULUM AND LEARNING	2	W	4			√	
30	FEDU1002	INTRODUCTION TO EDUCATIONAL MANAGEMENT	2	W	4			√	
31	SEDC2016	CHEMICAL KINETICS	3	W	4			√	
32	SEDC2018	POLYFUNCTIONAL ORGANIC CHEMISTRY	3	W	4			√	
33	SEDC3040	RESEARCH METHODOLOGY	2	W	4			√	
34	SEDC2020	EVALUATION IN CHEMISTRY TEACHING	3	W	4			√	
35	SEDC2022	MAIN GROUP ELEMENTS AND COMPOUNDS	3	W	4			√	
36	SEDC2024	CHEMICAL QUANTITATIVE ANALYSIS	2	W	4			√	
37	FEDU2004	PROFESSION OF EDUCATION	2	W	4			√	
38	FEDUP002	SCHOOL INTERNSHIP	4	W	4		√		√
39	SEDC2026	CHEMISTRY TEACHING PLAN	3	W	4		√		
40	SEDC3027	FUNDAMENTALS OF CHEMICAL SEPARATIONS	2	W	4			√	
41	SEDC3029	STATISTICS	2	W	4			√	
42	SEDC3031	TRANSITION ELEMENTS AND COORDINATION CHEMISTRY	2	W	4			√	
43	SEDC3037	ANALYTICAL CHEMISTRY PRACTICUM	2	W	4		√		
44	SEDC2028	PHYSICAL CHEMISTRY PRACTICUM	2	W	4		√		

No	Code	Course	SKS	Category	SDGs Target	Remarks			
						R B L	Pj BL	Case-M	MBKM
45	SEDC3035	ORGANIC CHEMISTRY PRACTICUM	2	W	4		√		
46	SEDC3033	ORGANIC REACTIONS	2	W	4			√	
47	FEDUP001	MICRO TEACHING	3	W	4			√	√
48	MKWUP001	COMMUNITY SERVICE PROGRAM	2	W	4		√		√
49	SEDC3032	INSTRUMENTAL CHEMICAL ANALYSIS	2	W	4			√	
50	SEDC3041	BIOCHEMISTRY PRACTICUM	1	W	4		√		
51	SEDC3039	BIOCHEMISTRY	2	W	4			√	
52	SEDC3034	INORGANIC CHEMISTRY PRACTICUM	2	W	4	√	√		
53	SEDC3036	LABORATORY MANAGEMENT	2	W	4		√		
54	SEDC2025	CHEMISTRY TEACHING MATERIAL REVIEW III	2	W	4		√		
55	SEDC3038	MOLECULAR SPECTROSCOPY	2	W	4		√		
56	SEDC3042	CHEMISTRY ENTREPRENEURSHIP	2	W	1		√		√
57	SEDC3044	CHEMISTRY ENTREPRENEURSHIP PRACTICE	1	W	1		√		√
58	SEDC3043	APPLIED CHEMISTRY	2	W	1		√		√
59	SEDC3030	CHEMISTRY SEMINAR	2	W	4		√		
60	FEDUPA01	SCRIPT	4	W	4	√			
61	SEDC6045	REVIEW OF VALUES IN CHEMISTRY LEARNING	2	P	4		√		√
62	SEDC6047	POLYMER CHEMISTRY	2	P	11		√		√
63	SEDC6049	FOOD CHEMISTRY	2	P	2			√	√
64	SEDC6046	ELECTROANALYTICAL CHEMISTRY	2	P	4			√	
65	SEDC2019	STRUCTURE DETERMINATION OF ORGANIC COMPOUNDS	2	P	4			√	√
66	SEDC6059	CHEMISTRY LEARNING MEDIA	2	P	4		√		√
67	SEDC6061	INDUSTRIAL INORGANIC CHEMISTRY	2	P	4			√	√
68	SEDC6063	RADIOCHEMISTRY	2	P	4			√	√
69	SEDC6065	ACTION RESEARCH	2	P	4			√	√
70	SEDC6067	CHEMISTRY LEARNING PROBLEMS REVIEW	2	P	4			√	√
71	SEDC6069	MINERALOGY	2	P	4			√	
72	SEDC6073	VALIDATION OF INSTRUMENTAL ANALYTICAL METHODS	2	P	4			√	
73	SEDC6075	SCHOOL CHEMISTRY EXPERIMENTS	2	P	4		√		√
74	SEDC6077	ENVIRONMENTAL CHEMISTRY	2	P	3			√	√
75	SEDC6079	BIOTECHNOLOGY	2	P	3			√	√

No	Code	Course	SKS	Category	SDGs Target	Remarks			
						RBL	PjBL	Case-M	MBKM
76	SEDC6081	SOLOIDS AND SURFACE CHEMISTRY	2	P	4			√	√
77	SEDC6048	BIOINORGANIC	2	P	4			√	√
78	SEDC6085	ORGANIC CHEMISTRY NATURAL RESOURCE	2	P	4			√	√
79	SEDC6050	STEAMC IN CHEMISTRY	2	P	4		√		√
80	SEDC6052	INNOVATIVE LEARNING DESIGN	2	P	4			√	√
81	SEDC6054	CHEMISTRY OF ESSENTIAL OILS	2	P	4		√		√
82	SEDC6057	CHEMISTRY OF WASTE MANAGEMENT	2	P	11		√		√
83	SEDC6058	VIRTUAL CHEMISTRY	2	P	4		√		√
84	SEDC6053	GREEN CHEMISTRY	2	P	13			√	√
85	SEDC6055	FORENSIC CHEMISTRY	2	P	16		√	√	
86	SEDC6071	MICROBIAL CHEMISTRY	2	P	4			√	√
87	SEDC6056	INDUSTRIAL BIOCHEMISTRY	2	P	4			√	√
88	SEDC6051	TEACHING AND LEARNING THEORIES IN CHEMISTRY	2	P	4		√	√	√

SDGs = Sustainable Development Goals targeted by USK include: (1) No Poverty; (3) Good Health and Well-being; (4) Quality Education; (11) Sustainable Cities and Communities; (13) Climate Action; (14) Life Below Water; (16) Peace, Justice, and Strong Institutions (Bappenas, 2017).

PBR = Research-Based Learning

PjBL = Project-Based Learning

Case-M = Case Method

MBKM = Freedom to Learn – Independent Campus Program

2.3. List of Equivalency and Recognition of MBKM Activities toward Credit Acknowledgment

2.3.1. List of Course Equivalencies

CODE	COURSE	SKS	CODE	COURSE	SKS
MKS101	INDONESIAN LANGUAGE	2	MKWU1003	INDONESIAN LANGUAGE	2
MKS106	DISASTER AND ENVIRONMENTAL STUDIES	2	MKWU1005	DISASTER AND ENVIRONMENTAL STUDIES	2
EDU101	FUNDAMENTAL OF EDUCATION	2	FEDU1001	FUNDAMENTAL OF EDUCATION	2
EDC101	BASIC CHEMISTRY I	3	SEDC1001	BASIC CHEMISTRY I	3
EDC108	BASIC CHEMICAL PRACTICUM	2	SEDC1003	BASIC CHEMICAL PRACTICUM I	1
			SEDC1004	BASIC CHEMICAL PRACTICUM II	1
EDC107	COMPUTER APPLICATION	2	SEDC1007	COMPUTER APPLICATION	2
EDCP09	TEACHING AND LEARNING THEORIES IN CHEMISTRY	2	SEDC6051	TEACHING AND LEARNING THEORIES IN CHEMISTRY	2

CODE	COURSE	SKS	CODE	COURSE	SKS
EDC111	BASIC MATHEMATICS	2	SEDC1011	MATHEMATICS FOR CHEMISTRY	2
EDC103	STOICHIOMETRY	2	SEDC1005	STOICHIOMETRY	2
MKS103	PANCASILA AND CIVIC EDUCATION	2	MKWU1002	CIVICS EDUCATION	2
MKS105	RELIGIOUS STUDIES	2	MKWU2001	RELIGIOUS STUDIES	2
MKS104	FUNDAMENTALS OF SOCIAL AND CULTURAL SCIENCES	2	MKWU1001	PANCASILA	2
EDU102	PHILOSOPHY OF EDUCATION	2	FEDU2003	PHILOSOPHY OF EDUCATION	2
EDC102	BASIC CHEMISTRY II	2	SEDC1002	BASIC CHEMISTRY II	2
EDC110	CHEMICAL SOLUTIONS PRACTICUM	1	SEDC1008	CHEMICAL SOLUTIONS PRACTICUM	1
EDC104	CHEMICAL SOLUTIONS	2	SEDC1006	CHEMICAL SOLUTIONS	2
EDC105	ANALYSIS OF CHEMISTRY BOOKS FOR GRADE X	2	SEDC1009	CHEMISTRY TEACHING MATERIAL REVIEW I	2
EDC106	ICT IN CHEMISTRY LEARNING	3	SEDC1012	ICT IN CHEMISTRY LEARNING	3
EDC211	GASES AND THERMODYNAMICS	2	SEDC1014	GASES AND THERMODYNAMICS	2
MKS201	ENGLISH	2	MKWU1004	ENGLISH	2
EDU201	PSYCHOLOGY EDUCATION	2	FEDU2001	PSYCHOLOGY EDUCATION	2
EDC201	MONOFUNGSIONAL ORGANIC CHEMISTRY	3	SEDC2001	MONOFUNGSIONAL ORGANIC CHEMISTRY	3
EDC112	ANALYSIS OF CHEMISTRY BOOKS FOR GRADE IX	2	SEDC1010	CHEMISTRY TEACHING MATERIAL REVIEW II	2
EDC203	TEACHING AND LEARNING STRATEGY	3	SEDC2015	TEACHING AND LEARNING STRATEGY	3
EDC205	CHEMICAL QUALITATIVE ANALYSIS	2	SEDC2017	CHEMICAL QUALITATIVE ANALYSIS	2
EDC207	STRUCTURE AND REACTIVITY OF INORGANIC COMPOUNDS	3	SEDC2019	STRUCTURE AND REACTIVITY OF INORGANIC COMPOUNDS	3
EDC109	CHEMICAL AND PHASE EQUILIBRIA	2	SEDC2023	CHEMICAL AND PHASE EQUILIBRIA	2
EDC209	CHEMICAL BONDS	3	SEDC2021	CHEMICAL BONDS	3
EDU202	CURRICULUM AND LEARNING	2	FEDU2002	CURRICULUM AND LEARNING	2
EDU204	INTRODUCTION TO EDUCATIONAL MANAGEMENT	2	FEDU1002	INTRODUCTION TO EDUCATIONAL MANAGEMENT	2
EDC202	CHEMICAL KINETICS	3	SEDC2016	CHEMICAL KINETICS	3
EDC204	POLYFINCTIONAL ORGANIC CHEMISTRY	3	SEDC2018	POLYFINCTIONAL ORGANIC CHEMISTRY	3
EDC312	RESEARCH METHODOLOGY	2	SEDC3040	RESEARCH METHODOLOGY	2
EDC206	EVALUATION IN CHEMISTRY TEACHING	3	SEDC2020	EVALUATION IN CHEMISTRY TEACHING	3
EDC208	MAIN GROUP ELEMENTS AND COMPOUNDS	3	SEDC2022	MAIN GROUP ELEMENTS AND COMPOUNDS	3

CODE	COURSE	SKS	CODE	COURSE	SKS
EDC210	CHEMICAL QUANTITATIVE ANALYSIS	2	SEDC2024	CHEMICAL QUANTITATIVE ANALYSIS	2
EDU301	PROFESSION OF EDUCATION	2	FEDU2004	PROFESSION OF EDUCATION	2
EDUP07	PLP I	2	FEDUP002	SCHOOL INTERNSHIP	4
EDUP09	PLP II	2			
EDC212	CHEMISTRY TEACHING PLAN	3	SEDC2026	CHEMISTRY TEACHING PLAN	3
EDC301	FUNDAMENTALS OF CHEMICAL SEPARATIONS	2	SEDC3027	FUNDAMENTALS OF CHEMICAL SEPARATIONS	2
EDC303	STATISTICS	2	SEDC3029	STATISTICS	2
EDC305	TRANSITION ELEMENTS AND COORDINATION CHEMISTRY	2	SEDC3031	TRANSITION ELEMENTS AND COORDINATION CHEMISTRY	2
EDC310	ANALYTICAL CHEMISTRY PRACTICUM	2	SEDC3037	ANALYTICAL CHEMISTRY PRACTICUM	2
EDC214	PHYSICAL CHEMISTRY PRACTICUM	2	SEDC2028	PHYSICAL CHEMISTRY PRACTICUM	2
EDC307	ORGANIC CHEMISTRY PRACTICUM	2	SEDC3035	ORGANIC CHEMISTRY PRACTICUM	2
EDC309	ORGANIC REACTIONS	2	SEDC3033	ORGANIC REACTIONS	2
EDU302	MICRO TEACHING	3	FEDUP001	MICRO TEACHING	3
MKSP02	KKN	2	MKWUP001	COMMUNITY SERVICE PROGRAM	2
EDC302	INSTRUMENTAL CHEMICAL ANALYSIS	2	SEDC3032	INSTRUMENTAL CHEMICAL ANALYSIS	2
EDC311	BIOCHEMISTRY PRACTICUM	1	SEDC3041	BIOCHEMISTRY PRACTICUM	1
EDC313	BIOCHEMISTRY	2	SEDC3039	BIOCHEMISTRY	2
EDC304	INORGANIC CHEMISTRY PRACTICUM	2	SEDC3034	INORGANIC CHEMISTRY PRACTICUM	2
EDC306	LABORATORY MANAGEMENT	2	SEDC3036	LABORATORY MANAGEMENT	2
EDC213	ANALYSIS OF CHEMISTRY TEXTBOOKS FOR GRADE XII	2	SEDC2025	CHEMISTRY TEACHING MATERIAL REVIEW III	2
EDC308	MOLECULAR SPECTROSCOPY	2	SEDC3038	MOLECULAR SPECTROSCOPY	2
EDCP01	CHEMISTRY COLLOQUIUM	2	SEDC3030	CHEMISTRY SEMINAR	2
EDUPA1	SCRIPT	4	FEDUPA01	SCRIPT	4
EDCP03	REVIEW OF VALUES IN CHEMISTRY LEARNING	2	SEDC6045	REVIEW OF VALUES IN CHEMISTRY LEARNING	2
EDC501	POLYMER CHEMISTRY	2	SEDC6047	POLYMER CHEMISTRY	2
EDCP05	FOOD CHEMISTRY	2	SEDC6049	FOOD CHEMISTRY	2
EDC502	ELECTROCHEMISTRY	2	SEDC6046	ELECTROANALYTICAL CHEMISTRY	2
EDC504	STRUCTURE DETERMINATION OF ORGANIC COMPOUNDS	2	SEDC2019	STRUCTURE DETERMINATION OF ORGANIC COMPOUNDS	2
EDCP11	CHEMISTRY LEARNING MEDIA	2	SEDC6059	CHEMISTRY LEARNING MEDIA	2
EDCP13	NANOMATERIAL	2	SEDC6061	INDUSTRIAL INORGANIC CHEMISTRY	2

CODE	COURSE	SKS	CODE	COURSE	SKS
EDC503	RADIOCHEMISTRY	2	SEDC6063	RADIOCHEMISTRY	2
EDCP15	ACTION RESEARCH	2	SEDC6065	ACTION RESEARCH	2
EDC315	APPLIED CHEMISTRY	2	SEDC3043	APPLIED CHEMISTRY	2
EDCP17	CHEMISTRY LEARNING PROBLEMS REVIEW	2	SEDC6067	CHEMISTRY LEARNING PROBLEMS REVIEW	2
EDC505	MINERALOGY	2	SEDC6069	MINERALOGY	2
EDC506	VALIDATION OF INSTRUMENTAL ANALYTICAL METHODS	2	SEDC6073	VALIDATION OF INSTRUMENTAL ANALYTICAL METHODS	2
EDCP08	SCHOOL CHEMISTRY EXPERIMENTS	2	SEDC6075	SCHOOL CHEMISTRY EXPERIMENTS	2
EDCP10	ENVIRONMENTAL CHEMISTRY	2	SEDC6077	ENVIRONMENTAL CHEMISTRY	2
EDC508	BIOTECHNOLOGY	2	SEDC6079	BIOTECHNOLOGY	2
EDC510	SOLOIDS AND SURFACE CHEMISTRY	2	SEDC6081	SOLOIDS AND SURFACE CHEMISTRY	2
EDC512	CHITOSAN CHEMISTRY	2	SEDC6048	BIOINORGANIC	2
EDC514	ORGANIC CHEMISTRY NATURAL RESOURCE	2	SEDC6085	ORGANIC CHEMISTRY NATURAL RESOURCE	2
EDCP07	CHEMO SOCIO TECHNO PRENEURSHIP	2	SEDC3042	CHEMISTRY ENTREPRENEURSHIP	2
			SEDC3044	CHEMISTRY ENTREPRENEURSHIP PRACTICE	1
EDCP02	STEAMC-BASED CHEMISTRY EDUCATION	2	SEDC6050	STEAMC IN CHEMISTRY	2
EDCP04	INNOVATIVE LEARNING DESIGN	2	SEDC6052	INNOVATIVE LEARNING DESIGN	2
EDCP06	CHEMISTRY OF ESSENTIAL OILS	2	SEDC6054	CHEMISTRY OF ESSENTIAL OILS	2
EDCP12	CHEMISTRY OF WASTE MANAGEMENT	2	SEDC6057	CHEMISTRY OF WASTE MANAGEMENT	2
EDCP14	VIRTUAL CHEMISTRY LABORATORY	2	SEDC6058	VIRTUAL CHEMISTRY	2
			SEDC6053	GREEN CHEMISTRY	2
			SEDC6055	FORENSIC CHEMISTRY	2
			SEDC6071	MICROBIAL CHEMISTRY	2
			SEDC6056	INDUSTRIAL BIOCHEMISTRY	2

3.8.2. List of Course Recognitions

Table 3.12. Regular Courses and University Compulsory Courses (MKRU) Eligible for Equivalency/Recognition through MBKM Activities

No	Course Code	Elective/Mandatory Course	SKS	MBKM Activities
1	FEDUP002	School Internship	4	Teaching Campus Program/ Teaching at Schools / Internship at Educational Institutions / Teaching Assistant
2	FEDUP001	Micro Teaching	3	
3	MKWUP001	Community Service Program	2	
4	SEDC3043	Applied Chemistry	2	
5	SEDC3042	Chemistry Entrepreneurship	2	
6	SEDC3044	Chemistry Entrepreneurship Practice	1	
7	SEDC6049	Food Chemistry	2	Independent Study / Independent Project
8	SEDC6054	Chemistry Of Essential Oils	2	
9	SEDC6057	Chemistry Of Waste Management	2	
10	SEDC6050	Steamc In Chemistry	2	Community-Based Village Project / Humanitarian Project / Entrepreneurship Program
11	SEDC6059	Chemistry Learning Media	2	
12	SEDC6067	Chemistry Learning Problems Review	2	
13	SEDC6058	Virtual Chemistry	2	
14	SEDC6063	Radiochemistry	2	
15	SEDC6077	Environmental Chemistry	2	
16	SEDC6047	Polymer Chemistry	2	Scientific Research
17	SEDC6052	Innovative Learning Design	2	
18	SEDC6045	Review Of Values In Chemistry Learning	2	
19	SEDC6065	Action Research	2	
20	SEDC6051	Teaching And Learning Theories In Chemistry	2	
21	SEDC6075	School Chemistry Experiments	2	
22	SEDC3030	Chemistry Seminar	2	Student Exchange
23	SEDC3029	Statistics	2	
24	SEDC3040	Research Methodology	2	
25	FEDUPA01	Script	4	Student Exchange
26	All courses in the Chemistry Education Study Program (CESP)			

Banda Aceh, 25 March 2024

Coordinator of the CESP



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3.9. Example of Lesson Plan (RPS) Using Case Method and Team-Based Project/PjBL in the Study Program

An example of a course lesson plan (RPS) utilizing the Case Method can be accessed via the following link ([click here](#)), and the Team-Based Project/PjBL example can be viewed at this link ([click here](#)).

3.10. Example of Course Contract of the Study Program

An example of the Course Contract for Learning Theories and Instruction is provided at the following link ([click here](#)), and the Polyfunctional Organic Chemistry Course Contract can be accessed via this link ([click here](#)).

CHAPTER 4

LEARNING PROGRAM EVALUATION PLAN

4.1. Relationship Between Graduate Profile and Intended Learning Outcomes (CPL)

Table 4.1. Matrix of the Relationship between Graduate Profiles and CPL

Graduate Profiles	GP-01	GP-02	GP-03	GP-04
CPL-01	H	H	H	H
CPL-02	H	H	H	H
CPL-03	H	H	H	H
CPL-04	H	H	H	H
CPL-05	H	H	H	M
CPL-06	H	H	H	H
CPL-07	M	M	M	H

Note: L = Low (0-40) M = Medium (41-70); H = High (71-100)

To monitor the achievement of graduate competencies, a matrix linking the National Qualifications Framework (SKL – SNDIKTI/KKNI) with the CPL can be used.

Table 4.2. Matrix of the Relationship between CPL (SNDikti/KKNI) and SKL Components (attitudes, knowledge, general skills, specific skills). *SKL is the term used in SNDikti and is essentially equivalent to CPL.*

Competency (SKL)*	CPL-01	CPL-02	CPL-03	CPL-04	CPL-05	CPL-06	CPL-07
Attitude (S)	√				√	√	
Knowledge (P)	√	√	√	√	√	√	√
General Skills (KU)		√					√
Specific Skills (KK)	√		√	√	√	√	

*In the Minister of Education, Culture, Research, and Technology Regulation Number 53 of 2023, it is not mandatory to specify them in the Course Learning Outcomes (CPMK).

4.2. Relationship Between Courses and Intended Learning Outcomes (CPL)

A sample matrix illustrating how each course contributes to the achievement of Intended Learning Outcomes (CPL) is shown below:

Select the course that has the highest relevance (H) to the achievement of a particular CPL. Assessment of a CPL can be carried out by using examples of assessments from

the CPMKs that contribute to that CPL. Each CPL must be measured by at least three courses. An example of CPL weighting calculation from semester 1 to 8 can be seen in Table 4.3. In the example shown in Table 4.3, each CPL is labeled with a code such as A, B, C, and so on. The contribution of a course to the achievement of CPL is illustrated by the course "Material Analysis Laboratory" (2 credits), which contributes to CPL C and CPL I. Since the course is 2 credits, the teaching team and study program determine that CPL C is 75% related (i.e., 1.5 credits) and CPL I is 25% related (i.e., 0.5 credits). The assessment percentage for a specific CPL is calculated by dividing the total credit weight for that CPL by the total CPL credits (37). For example, if the total for CPL A is 4.4, then the calculation is $(4.4 / 37) \times 100\% = 12\%$.

Table 4.3. Example of a Weight Calculation Matrix for CPL in CESP, USK

NO	SMT	CODE	COURSE	SKS	CPL*							Total
					01	02	03	04	05	06	07	
1	I	MKWU1003	INDONESIAN LANGUAGE	2	2							2
2	I	MKWU1005	DISASTER AND ENVIRONMENTAL STUDIES	2	0.8		1.2					2
3	I	FEDU1001	FUNDAMENTAL OF EDUCATION	2		2						2
4	I	SEDC1001	BASIC CHEMISTRY I	3	1		2					3
5	I	SEDC1003	BASIC CHEMICAL PRACTICUM I	1	0.2					0.8		1
6	II	SEDC1004	BASIC CHEMICAL PRACTICUM II	1	0.2					0.8		1
7	I	SEDC1007	COMPUTER APPLICATION	2		1.2	0.8					2
8	I	SEDC1011	MATHEMATICS FOR CHEMISTRY	2			2					2
9	I	SEDC1005	STOICHIOMETRY	2			1.2		0.8			2
10	II	MKWU1002	CIVICS EDUCATION	2	2							2
11	III	MKWU2001	RELIGIOUS STUDIES	2	2							2
12	I	MKWU1001	PANCASILA	2	2							2
13	II	FEDU2003	PHILOSOPHY OF EDUCATION	2		2						2
14	II	SEDC1002	BASIC CHEMISTRY II	2	0.2		1.8					2
15	II	SEDC1008	CHEMICAL SOLUTIONS PRACTICUM	1	0.2					0.8		1
16	II	SEDC1006	CHEMICAL SOLUTIONS	2			1.8			0.2		2
17	I	SEDC1009	CHEMISTRY TEACHING MATERIAL REVIEW I	2			2					2
18	II	SEDC1012	ICT IN CHEMISTRY LEARNING	3		1.2	1.8					3
19	II	SEDC1014	GASES AND THERMODYNAMICS	2	0.2		1.8					2
20	II	MKWU1004	ENGLISH	2	2							2
21	III	FEDU2001	PSYCHOLOGY EDUCATION	2		2						2
22	III	SEDC2001	MONOFUNGSIONAL ORGANIC CHEMISTRY	3	0.2		2.8					3

NO	SMT	CODE	COURSE	SKS	CPL*							Total
					01	02	03	04	05	06	07	
23	II	SEDC1010	CHEMISTRY TEACHING MATERIAL REVIEW II	2			1	1				2
24	III	SEDC2015	TEACHING AND LEARNING STRATEGY	3		3						3
25	III	SEDC2017	CHEMICAL QUALITATIVE ANALYSIS	2			2					2
26	III	SEDC2019	STRUCTURE AND REACTIVITY OF INORGANIC COMPOUNDS	3			3					3
27	III	SEDC2023	CHEMICAL AND PHASE EQUILIBRIA	2			2					2
28	III	SEDC2021	CHEMICAL BONDS	3	0.2		2.8					3
29	IV	FEDU2002	CURRICULUM AND LEARNING	2		2						2
30	IV	FEDU1002	INTRODUCTION TO EDUCATIONAL MANAGEMENT	2	0.2	1.8						2
31	IV	SEDC2016	CHEMICAL KINETICS	3			2		1			3
32	IV	SEDC2018	POLYFUNCTIONAL ORGANIC CHEMISTRY	3	0.2		2.8					3
33	VI	SEDC3040	RESEARCH METHODOLOGY	2				2				2
34	IV	SEDC2020	EVALUATION IN CHEMISTRY TEACHING	3		1	2					3
35	IV	SEDC2022	MAIN GROUP ELEMENTS AND COMPOUNDS	3			2		1			3
36	IV	SEDC2024	CHEMICAL QUANTITATIVE ANALYSIS	2			2					2
37	V	FEDU2004	PROFESSION OF EDUCATION	2		2						2
38	VII	FEDUP002	SCHOOL INTERNSHIP	4	0.2			2.8	1			4
39	IV	SEDC2026	CHEMISTRY TEACHING PLAN	3				3				3
40	V	SEDC3027	FUNDAMENTALS OF CHEMICAL SEPARATIONS	2			2					2
41	V	SEDC3029	STATISTICS	2			2					2
42	V	SEDC3031	TRANSITION ELEMENTS AND COORDINATION CHEMISTRY	2			2					2
43	V	SEDC3037	ANALYTICAL CHEMISTRY PRACTICUM	2						2		2
44	IV	SEDC2028	PHYSICAL CHEMISTRY PRACTICUM	2	0.2					1.8		2
45	V	SEDC3035	ORGANIC CHEMISTRY PRACTICUM	2	0.2					1.8		2

NO	SMT	CODE	COURSE	SKS	CPL*							Total
					01	02	03	04	05	06	07	
46	V	SEDC3033	ORGANIC REACTIONS	2			2					2
47	VI	FEDUP001	MICRO TEACHING	3		0.5	0.5	2				3
48	VII	MKWUP001	COMMUNITY SERVICE PROGRAM	2	0.2				1.8			2
49	VI	SEDC3032	INSTRUMENTAL CHEMICAL ANALYSIS	2			2					2
50	V	SEDC3041	BIOCHEMISTRY PRACTICUM	1						1		1
51	V	SEDC3039	BIOCHEMISTRY	2			2					2
52	VI	SEDC3034	INORGANIC CHEMISTRY PRACTICUM	2					0.8	1.2		2
53	VI	SEDC3036	LABORATORY MANAGEMENT	2						2		2
54	III	SEDC2025	CHEMISTRY TEACHING MATERIAL REVIEW III	2			1	1				2
55	V	SEDC3043	APPLIED CHEMISTRY	2			1				1	2
56	VI	SEDC3038	MOLECULAR SPECTROSCOPY	2			1.2		0.8			2
57	VI	SEDC3030	CHEMISTRY SEMINAR	2	0.2					1.8		2
58	VIII	FEDUPA01	SCRIPT	4		1	1		1	1		4
59	V	SEDC6045	REVIEW OF VALUES IN CHEMISTRY LEARNING	2	1	1						2
60	V	SEDC6047	POLYMER CHEMISTRY	2			1.2		0.8			2
61	V	SEDC6049	FOOD CHEMISTRY	2			2					2
62	VI	SEDC6046	ELECTROANALYTICAL CHEMISTRY	2			2					2
63	VI	SEDC2019	STRUCTURE DETERMINATION OF ORGANIC COMPOUNDS	2	0.2		1.8					2
64	VII	SEDC6059	CHEMISTRY LEARNING MEDIA	2		2						2
65	VII	SEDC6061	INDUSTRIAL INORGANIC CHEMISTRY	2			2					2
66	VII	SEDC6063	RADIOCHEMISTRY	2	0.2		1.8					2
67	VII	SEDC6065	ACTION RESEARCH	2	0.2	1.8						2
68	VII	SEDC6067	CHEMISTRY LEARNING PROBLEMS REVIEW	2		1	1					2

NO	SMT	CODE	COURSE	SKS	CPL*							Total
					01	02	03	04	05	06	07	
69	VII	SEDC6069	MINERALOGY	2			2					2
70	VIII	SEDC6073	VALIDATION OF INSTRUMENTAL ANALYTICAL METHODS	2			2					2
71	VIII	SEDC6075	SCHOOL CHEMISTRY EXPERIMENTS	2	0.2		1.8					2
72	VIII	SEDC6077	ENVIRONMENTAL CHEMISTRY	2	0.2		1.8					2
73	VIII	SEDC6079	BIOTECHNOLOGY	2			2					2
74	VIII	SEDC6081	SOLOIDS AND SURFACE CHEMISTRY	2			1.2		0.8			2
75	VIII	SEDC6048	BIOINORGANIC	2			2					2
76	VIII	SEDC6085	ORGANIC CHEMISTRY NATURAL RESOURCE	2			2					2
77	VI	SEDC3042	CHEMISTRY ENTREPRENEURSHIP	2	0.2						1.8	2
78	VI	SEDC3044	CHEMISTRY ENTREPRENEURSHIP PRACTICE									
79	VI	SEDC6050	STEAMC IN CHEMISTRY	2			1		0.5	0.5		2
80	VI	SEDC6052	INNOVATIVE LEARNING DESIGN	2		1		1				2
81	VI	SEDC6054	CHEMISTRY OF ESSENTIAL OILS	2		1					1	2
82	V	SEDC6057	CHEMISTRY OF WASTE MANAGEMENT	2	0.2		1.8					2
83	VI	SEDC6058	VIRTUAL CHEMISTRY	2	0.2			1.8				2
84	V	SEDC6053	GREEN CHEMISTRY	2	2							2
85	V	SEDC6055	FORENSIC CHEMISTRY	2	0.2		1			0.8		2
86	VII	SEDC6071	MICROBIAL CHEMISTRY	2			2					2
87	VI	SEDC6056	INDUSTRIAL BIOCHEMISTRY	2			2					2
88	V	SEDC6051	TEACHING AND LEARNING THEORIES IN CHEMISTRY	2	0.2			1.8				2
Total Weight of CPL Assessment				186	19.6	27.5	91.9	16.4	10.3	16.5	3.8	186
Percentage of CPL Assessment Weight					10.54	14.78	49.41	8.82	5.54	8.87	2.04	100

Key Points to Focus on in Measuring the Achievement of CPL:

1. A CPL can be achieved through several CPMKs distributed across more than one course.
2. CPMKs should remain consistent even if the course name changes.
3. Each CPL should be linked to no more than four courses to simplify the calculation.
4. The number of CPMKs per course should not exceed five, although they can be expanded with sub-CPMKs.
5. The achievement of CPMKs within a course must be fully (100%) represented across all types of assessments used in that course.
6. A student score above 50 may be considered as having passed a particular CPMK.

Example of Student CPL Scores:

Name: Titanium Dioksidana

Student ID (NPM): 21061030400XX

Smt	No	Code	Course	CPL-01	CPL-02	CPL-03	CPL-04	CPL-05	CPL-06	CPL-07
I	1	MKWU1001	PANCASILA	78						
II	2	SEDC1006	CHEMICAL SOLUTIONS			79.96				
	3	SEDC1008	CHEMICAL SOLUTIONS PRACTICUM	79.5					75	
III	4	SEDC2021	CHEMICAL BONDS	80		79.5				
IV	5	SEDC2026	CHEMISTRY TEACHING PLAN				89.25			
V	6	SEDC3043	APPLIED CHEMISTRY			72.43				79.4
VI	7	SEDC3038	MOLECULAR SPECTROSCOPY			76		85.38		
	8	SEDCP610	ESSENTIAL OIL CHEMISTRY		92.5					79.4

	9	SEDC3042	CHEMISTRY ENTREPRENEURSHIP	84.5						85.38
	10	SEDC6052	INNOVATIVE LEARNING DESIGN		87.5		92.5			
VII	11	SEDC6059	CHEMISTRY LEARNING MEDIA		80.4					
	12	MKWUP001	COMMUNITY SERVICE PROGRAM			87		88.0		
VIII	13	SEDC6085	ORGANIC CHEMISTRY NATURAL RESOURCE			80				
	14	FEDUPA01	SCRIPT		85		89.4	88.9	80.0	
CPL Score				80.5	86.35	79.14	90.33	87.42	77.5	81.39

Note: The calculation of CPL scores is based on the weight of the course's CPL contribution relative to the total weight of that CPL.

Example of a Student CPL Transcript in the Chemistry Education Study Program at USK:



KEMENTERIAN PENDIDIKAN TINGGI, SAINS DAN TEKNOLOGI
UNIVERSITAS SYIAH KUALA
FAKULTAS KEGURUAN DAN ILMU PENDIDIKAN
DEPARTEMEN PENDIDIKAN KIMIA
DARUSSALAM, BANDA ACEH
Alamat: Darussalam, Banda Aceh, Telp. /Fax (0651) 53498
Email: kimiafkip@gmail.com , Website: www.kimia.fkip.usk.ac.id

TRANSCRIPT OF GRADUATE LEARNING OUTCOMES (GLO)

No. XXX/X/UN11.14.3/KM/2024

Name : Titanium Dioksida Fakultas : KIP
Student ID : 21061030400XX Study Program : Chemistry Education
Place of Birth : Banda Aceh Education Level : Bachelor
Date of Birth : 01 January 2003 Graduation Date :

No	Code	Graduate Learning Outcomes	Score	Category
1	GLO-01	Demonstrate responsible and ethical behavior in the learning process by adopting positive habits aligned with scientific principles and societal norms, fostering effective self-management and social skills.	80.5	Good
2	GLO-02	Demonstrate the ability to analyze and apply pedagogical theories and concepts supported by TPACK in chemistry education to provide engaging and meaningful learning experiences for students.	86.35	Very Good
3	GLO-03	Proficient in implementing chemical concepts, principles, and laws within chemistry education through innovative pedagogical methods and approaches to foster logical reasoning and meaningful learning experiences that are contextually relevant to everyday life.	79.14	Good
4	GLO-04	Capable of conducting chemistry teaching process at secondary schools by utilizing diverse resources and media relevant to advancements in science and technology.	90.33	Very Good
5	GLO-05	Proficient in solving problems by applying appropriate methodologies to produce research and publications in the fields of chemistry and chemistry education.	87.42	Very Good
6	GLO-06	Demonstrate the ability to perform chemical practices and handle chemicals carefully and accurately by applying proper laboratory procedures to support experiment-based learning.	77.5	Good
7	GLO-07	Capable of designing a simple and creative business plan in the field of chemistry or across disciplines to support entrepreneurial initiatives.	81.39	Very Good

Note:

81–100 : Very Good
61–80 : Good
51–60 : Fair
< 51 : Poor

Banda Aceh, 1 March 2024
Head of Department,

Dr. Drs. Syahrial, M.Si.
NIP: 196712281993031003

To ensure that every graduate of the USK Study Program has fulfilled all the established Intended Learning Outcomes, the following steps are undertaken:

1. The Study Program sets minimum CPL graduation standards, target levels for CPL achievement, and categories for CPL graduation predicates (Excellent, Good, Satisfactory, and Poor).
2. The Study Program monitors students' CPL achievement levels at the end of each academic year and provides recommendations for those whose CPL fulfillment has not yet met the established targets.
3. The Study Program issues a CPL Transcript in addition to the Academic Transcript for all graduates at the time of graduation (Yudisium).

4.3. Monitoring the Implementation of Learning and Evaluation of CPMK Achievement

Monitoring the implementation of learning and the evaluation of Course Learning Outcome (CPMK) achievement are carried out as part of the PDCA (Plan, Do, Check, Act) cycle to ensure continuous improvement. The monitoring of learning implementation focuses on the content of instruction, the learning process, the assessment process, and lecturer attendance. The evaluation of CPMK achievement emphasizes the pass rate of each CPMK, as well as the highest, lowest, and average student scores.

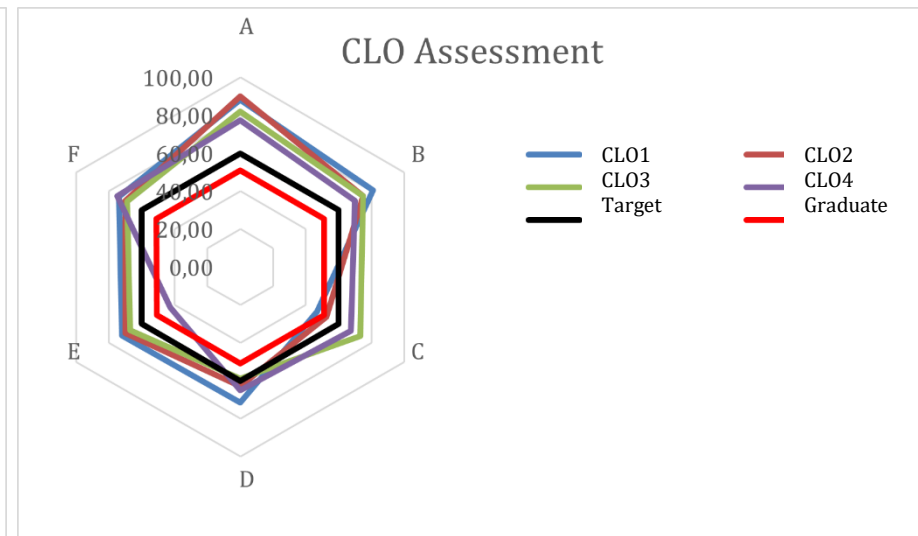
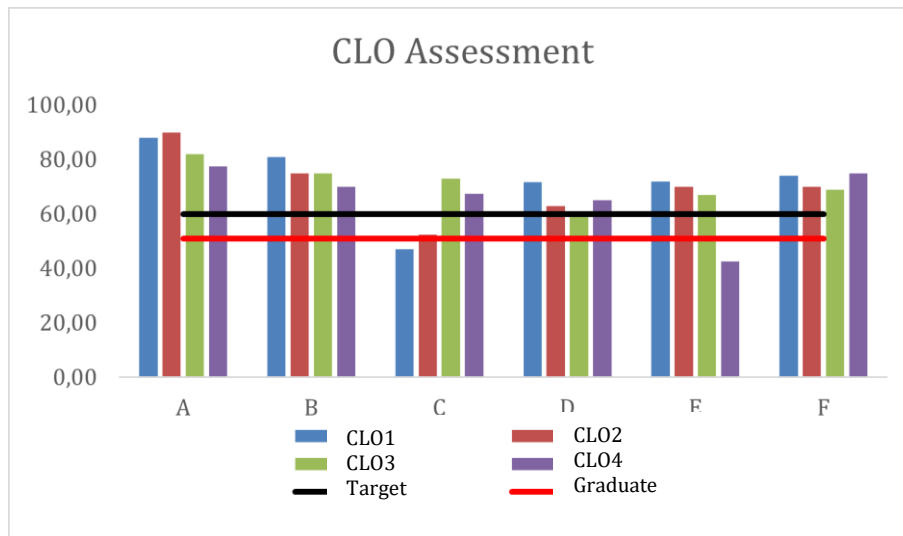
The monitoring and evaluation are conducted as follows:

1. Each lecturer is required to prepare a course control plan at the beginning of the semester.
2. Each lecturer must take attendance and complete a weekly lecture monitoring sheet every time a class is held.
3. In one semester, lecturers must conduct 16 class meetings, including the midterm and final examinations.
4. At the end of each semester, students evaluate the lecturer's performance by completing an online questionnaire.
5. At the end of each semester, lecturers are required to evaluate the implementation of learning and the achievement of learning outcomes by completing a portfolio provided by the study program. The results must be reported to the study program for further evaluation.
6. The study program coordinator evaluates lecturer attendance, the alignment between the lesson plan (RPS) and its implementation, and the timeliness of final grade submission.

The following is an example of the evaluation and analysis of Course Learning Outcome (CPMK) Achievement, which can be used as a reference by study programs within Universitas Syiah Kuala.

Evaluation of Course Learning Outcome (CPMK) Achievement:

Student Name	Assessment Item								CPMK Score				CPL Score			Final Score	
	Assign ment 1	Assign ment 2	Quiz 1	Quiz 2	Midterm Exam		Final Exam		CPL-01	CPL-03		CPL-06	CPL-01	CPL-03	CPL-06		
	CPMK 1	CPMK 2	CPMK 3	CPMK 4	CPMK 1	CPMK 2	CPMK 3	CPMK 4	CPMK 1	CPMK 2	CPMK 3	CPMK 4				Score	Letter Grade
	10%	10%	15%	15%	15%	10%	10%	15%	25.0%	20.0%	25.0%	30.0%				25%	
A	100	90	80	70	80	90	85	85	88.00	90	82	77.5	88.00	85.56	77.5	84	AB
B	90	80	75	80	75	70	75	60	81.00	75	75	70	81.00	75.00	70	75	B
C	50	60	75	80	45	45	70	55	47.00	52.5	73	67.5	47.00	63.89	67.5	61	BC
D	89	56	45	60	60	70	80	70	71.60	63	59	65	71.60	60.78	65	65	BC
E	75	60	75	45	70	80	55	40	72.00	70	67	42.5	72.00	68.33	42.5	62	BC
F	80	60	75	90	70	80	60	60	74.00	70	69	75	74.00	69.44	75	72	B
average	80.7	67.7	70.8	70.8	66.7	72.5	70.8	61.7	72.3	70.1	70.8	66.3	72.3	70.5	66.3	69.7	



Analysis of CPMK Achievement:

- The passing grade for CPMKs in course X is set at 51 on a scale of 100, meaning that the minimum expected student understanding of the learning outcomes is 51%. The course instructor targets an average class score of 60 out of 100, or 60% comprehension of the intended learning outcomes for each CPMK.
- The average CPMK scores for all students show values greater than 60, indicating that the target has been exceeded. However, 2 students (approximately 33.33% of the total 6 students) did not meet the minimum passing score for CPMK 1 and CPMK 4, as shown in the CPMK score column.
- The average CPL scores (CPL) for all students also exceed 60. However, 2 students scored below the passing threshold in CPL A and CPL F, as indicated in the CPL score column.
- The final average grade of the students is 69.7.

Control Measures Taken

Based on the achieved learning outcomes, a further evaluation was conducted to assess the attainment of student learning results. Special observation was carried out for two students whose CPMK scores were still below the minimum target. The observation revealed that both students had low scores in the midterm and final examinations. The course coordinator also confirmed the attendance records of the two students during the lectures. To achieve the intended learning outcomes, the main challenge faced by these two students was their lack of preparation for exams that required design and calculation skills. Specifically, they did not bring the thermodynamic tables, which were essential for solving the exam problems effectively. As a result, the students were unable to complete the exam questions satisfactorily.

Future Control Plan

To optimize the achievement of the intended learning outcomes, several strategies will be implemented:

- Monitoring each student's condition during online learning. Lecturers are encouraged to provide alternative learning methods as a solution for students facing difficulties with online learning. More in-class exercises, particularly on design and calculation problems, should be given.
- Providing students with the opportunity to take a remedial exam if their initial test scores fall below the targeted achievement level.

Assessment and evaluation of Intended Learning Outcomes (CPL) are conducted by the Study Program at the end of each academic year to monitor and evaluate the achievement of CPL by each student cohort. The results serve as a basis for consideration and continuous improvement of the learning process in the Bachelor's Program in Chemistry Education.