



CURRICULUM OVERVIEW

Bachelor of Chemistry Education

**Faculty of Mathematics and Natural Science
Universitas Negeri Jakarta**

2021

A. OBJECTIVES OF THE DEGREE PROGRAMME

The Vision and Mission of Institution

Vision of Universitas Negeri Jakarta:

Becoming a Reputable University in the Asia

Mission of Universitas Negeri Jakarta:

Organizing the Tridharma of Higher Education that is Excellent and Useful for the Benefit of Humans

The mission of UNJ is stated in the Decree of Minister of Research, Technology and Higher Education No. 44 Year 2018, article 25 about UNJ Statute. The mission is a step and guidance to organize the university to achieve its vision of becoming a reputable university in the Asian region. Some fundamental values applied in organizing UNJ are as follows: (1). Truth and Wisdom; (2) Academic Integrity; (3) Democratic and Humanist; (4) Diversity and Equality; (5) Beneficial for Humanity; (6) Sustainability. Implementation of the UNJ mission is directed to achieve university goals, such as to create a smart, advanced, and civilized society through science and technology development, application, and expansion.

To achieve the vision, mission and aims, UNJ has arranged: (a) a long-term development plan that consist of plans and development program for 25 years; (b) strategic plan that consist of plans and development program for 5 years; and (c) operational plan that consist of strategic plan explanation for one year of lists of program and activity.

The Vision and Mission of Faculty

Vision of Faculty of Mathematics and Natural Science (FMIPA-Fakultas Matematika dan Pengetahuan Alam)

To become an excellent and competitive faculty in the field of Mathematics, Natural Sciences, Mathematics Education, and Natural Sciences Education in ASIA based on faith and piety

Mission of Faculty

1. To conduct a certified education and teaching activity by using information technology and communication to create a graduate who is compliant with stakeholder requirement and able to contend in ASIA.
2. To build conducive academic circumstances, generating religious circumstances during academic and non-academic activity, and growing entrepreneurship ability for the students.
3. To conduct research and developments in Mathematics and Science study program, and Mathematics and Science Education study program in accordance with development of science and technology.
4. To conduct community services relevant to Mathematics and Science study program, and Mathematics and Science Education study program.
5. To establish and develop a partnership with various institutions, both national and international institutions.

Objective and Learning Outcomes of a Degree Program (Intended Qualification Profile) Qualification Profile (QP)

The Faculty of Mathematics and Natural Sciences (FMIPA) is part of the Jakarta State University (UNJ) which has the responsibility to have graduates with qualifications in the fields of Mathematics and Natural Sciences and professional Mathematics education, able to utilize information and communication technology, have entrepreneurial skills, have character and are religious, according to stakeholder needs, and able to compete at ASIA level.

The Profile of graduate of bachelor and master study program is determined based on:

1. The Indonesian President's Regulation (PPRI) No. 8/2012 concerning KKN (Indonesian National Curriculum Framework), Permenristekdikti (Regulation of Minister of Research, Technology and Higher Education) No. 44 of 2015 concerning SNPT (National Standards for Higher Education).
2. Minimum Learning Mastery Standard for bachelor and master study program set by Professional association Society.
3. ASIIN standard for bachelor and master's degree programs.

The Vision of Chemistry Education Study Program:

To become the chemistry education programme that provides chemistry education graduates who are professional, innovative, adaptive, and competitive at the national, regional, and global levels.

B. PROGRAM EDUCATIONAL OBJECTIVES(PEO)

Qualification Profile (QP) of Chemistry Education Study Program

The Qualification profile of a bachelor's degree in the Chemistry Education Study Program and its specifications is presented in the table below.

Table 1. QP of Chemistry Education Study Program

No	Occupational Profile	Specifications
1	Chemistry educators	Be able to have excellent competencies in professional, pedagogic, social competence, and personal competencies.
2	Novice researchers	Be able to conduct research based on research methodology to be applied in field work.
3	Entrepreneur	Be able to develop and apply entrepreneurial values in relevant chemistry education fields.

Program Educational Objective (PEO)

Program Educational Objective was developed based on vision and mission in developing graduates of chemistry education study program who possess academic capabilities, innovative, competitive, and lifelong learning as educator, novice researchers, and entrepreneur, who are able to:

1. possess academic capabilities, innovative, adaptive, competitive, and lifelong learning
2. be professionals with attitudes, work ethics, responsibility, leadership, communication skills, professionalism, and can work individually and collaborate in groups
3. argue scientifically to solve problems in career, community, nation, and global.

The relationship between Courses and Qualification Profile to reach PEO show in diagram below,

COURSE FLOW OF BACHELOR OF CHEMISTRY EDUCATION

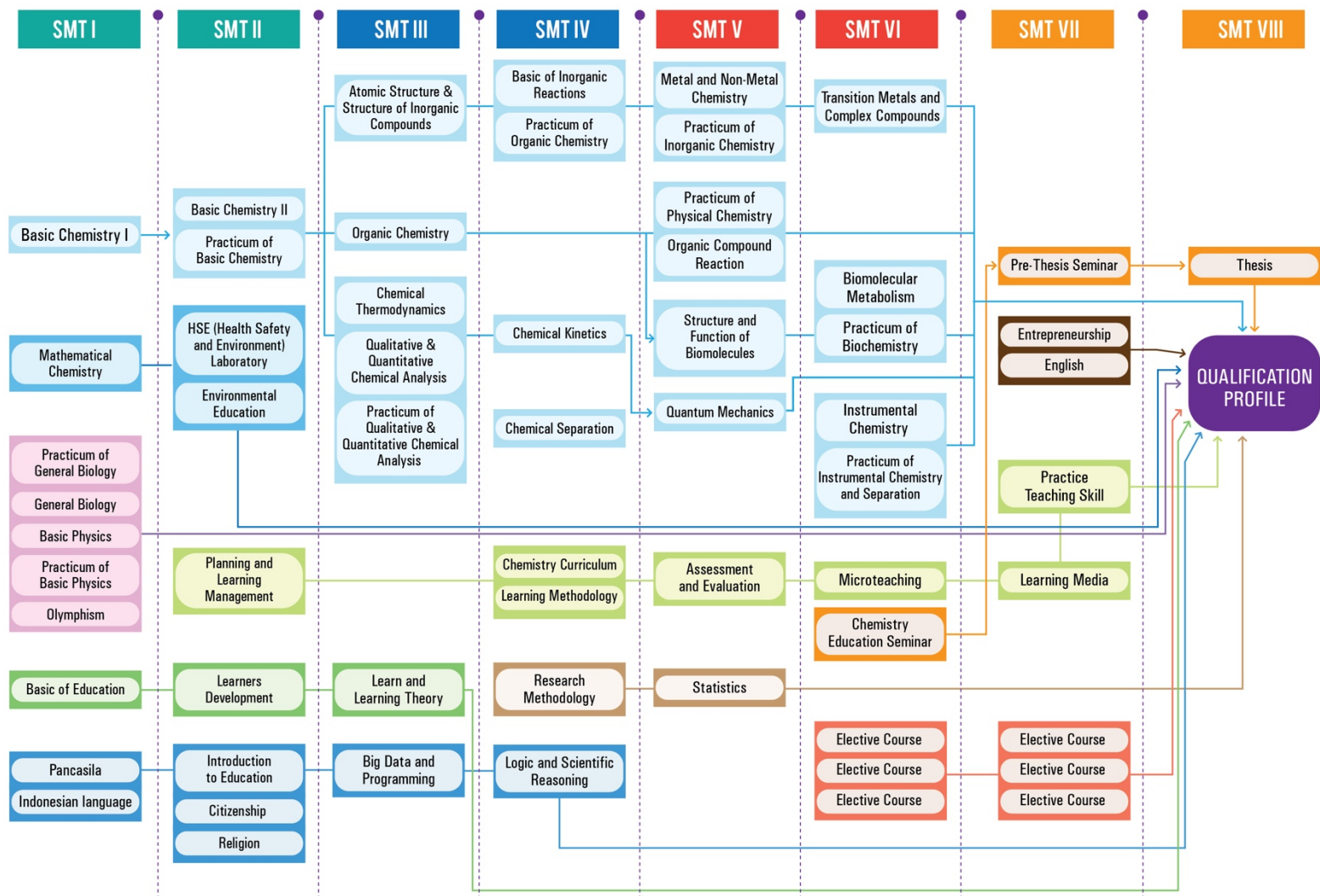


Figure 1. Course Flow: Correlation Courses and QP

C. PROGRAM LEARNING OUTCOMES (PLO)

General procedures of graduate profile formation, learning outcome, and curriculum of study program have been in accordance with the standard (from guidelines of curriculum development, such as Higher Education and Profession Association, KKNI, Accreditation Bureau, and Association Profession of Study Program) as presented in Figure 2 and verified by academic board of faculty. The procedure involves both internal and external stakeholders, including academic staff, university and faculty supporter, alumni, students, experts, and external stakeholders.

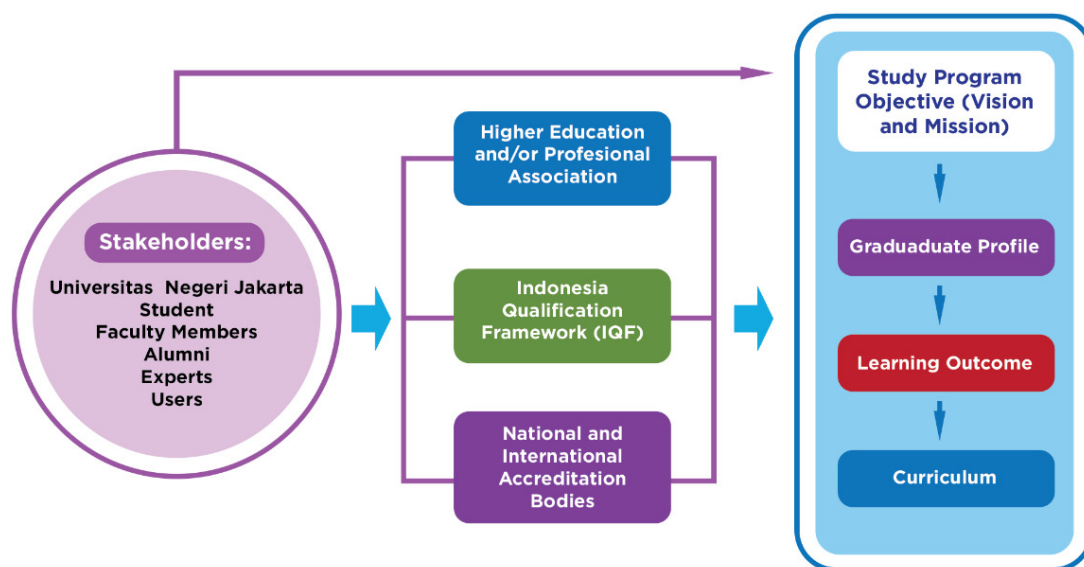


Figure 2. Design of Mechanism Scheme of Program Learning Outcomes

Learning Outcomes of bachelor's degree of Chemistry Education Study Program are presented in Table 2. The PLOs are classified into two areas, namely social competence and specialist competence.

Table 2. PLOs of Chemistry Education Study Program

Area	Code	Program Learning Outcome
Social Competence	PLO1	Be able to apply religious attitudes, responsibility, leadership, communication skills, professionalism, and can work individually and collaborate in groups.
	PLO 2	Be able to apply logical, critical, systematic, innovative thinking, collaborative skills to build networks, self-development, argue scientifically to solve problems in career, community, nation, and global.
Specialist competences	PLO 3	Able to integrate mathematical and basic concepts of science to solve problems in chemistry
	PLO 4	Be able to understand theoretical concepts, such as organic chemistry, biochemistry, analytical chemistry, physical chemistry, inorganic chemistry.
	PLO 5	Be able to integrate chemical concepts, pedagogical chemistry knowledge, curriculum, methodology, classroom management, media, assessment, and evaluation.
	PLO 6	Be able to apply the basics of the scientific method and academic integrity in research and scientific works.

Area	Code	Program Learning Outcome
	PLO 7	Be able to design and apply chemistry learning based on technological pedagogical content knowledge (TPACK).
	PLO 8	Be able to plan, manage, and evaluate activities in the laboratory by considering the principles of HSE (Health Safety and Environment).
	PLO 9	Be able to identify problems and determine alternative solutions based on research theory and findings, as well as design and implement them in chemical education research.
	PLO 10	Be able to apply entrepreneurial values as the basis for simple business design in the field of chemistry education or other relevant fields.
	PLO 11	Be able to apply basic skills in managing educational institutions in an innovative and adaptive manner.

Subject-Specific Criteria (SSC)

Subject-specific criteria are developed based on the classification of chemistry study program body of knowledge and its PLO during the course determination. The description of Subject-Specific Criteria (SSC) for the Chemistry Study Program and Chemistry Education Study Program is presented below:

Table 3. SSC of Chemistry Study Program and Chemistry Education Study Program

SSC (Subject-Specific Criteria)		
Specialist competences	SSC 1	Have gained chemistry-relevant fundamental knowledge of mathematics and the natural sciences.
	SSC 2	Be able to have sound knowledge of the core subjects of chemistry including inorganic, organic and physical chemistry, as well as of analytical chemistry.
	SSC 3	Be able to analyze subject's characteristics (content knowledge), students' characteristics and to select appropriate methods, models, approaches, strategies and media and to apply actively, innovatively, creatively in each educational unit.
	SSC 4	Be able to carry out practical chemistry work and have learnt how to handle chemicals independently and safely in the lab.
	SSC 5	Be able to have knowledge of safety and environmental issues and the legal fundamentals.
	SSC 6	Have gained methodological competence in chemistry education and are able to apply this in other contexts.
	SSC 7	Be able to obtain, interpret and evaluate data of scientific and technical relevance, and to draw sound conclusions, which take into account scientific, technological and ethical findings.
	SSC 8	Be able to solve problems of a scientific/application-oriented nature independently, and to present the results.
	SSC 9	Be able to pursue life-long learning.
	SSC 10	Be able to communicate with colleagues at the working field as well as with the broader public, about chemistry education-related contents and problems.

SSC (Subject-Specific Criteria)		
Social competences	SSC 11	Be aware of social and ethical responsibility in their actions and be able to develop appropriate leadership responsibility.
	SSC 12	Be able to work both alone and as a member of international, mixed-gender groups
	SSC 13	Be prepared for being in professional life and an academic environment, through adequate practical relevance of the degree programme.

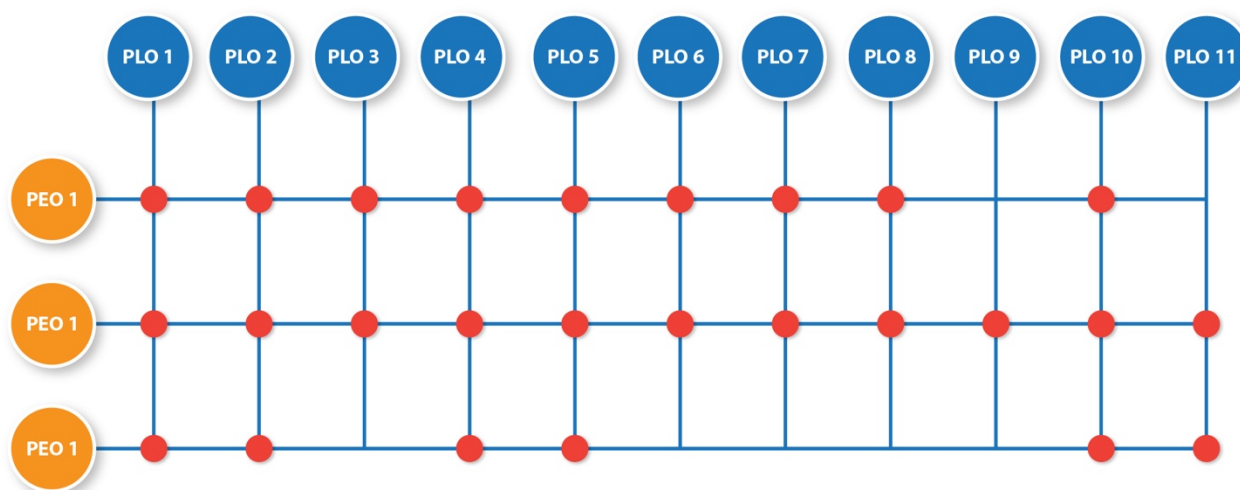


Figure 3. Correlation between Subject-Specific Criteria (SSC) of Chemistry Education with PLO

D. PROGRAMME STRUCTURE

The curriculum structure in the bachelor degree program refers to higher education regulation (Permenristekdikti number 44 of 2015 and Permendikbud Number 3 of 2020). In addition to follow the Indonesian National Qualifications Framework (KKNI), the National Higher Education Standards (SNPT), the standards of profession, in Chemistry is from the Indonesian Chemistry Consortium (HKI) by considering the orientation of future challenges and international accreditation. Name of the degree program is based on the Decree of the Minister of Research, Technology and Higher Education of the Republic of Indonesia Number 57/M/KPT/2019 concerning Names of Study Programs in Higher Education in Indonesian and in English. The title to be attached to the bachelor's degree of Chemistry Education is Bachelor of Education (B.Ed) or Sarjana Pendidikan (S.Pd) in Indonesian language

The courses that must be completed during a minimum study period of 8 (eight) semesters and a maximum of 14 (fourteen) semesters with a credit unit range of 144-147 credits or 216-220,5 ECTS. In the final year, students conduct research as final thesis. The curriculum structure the Chemistry Education study program consists of 4 groups of courses of

- a. University Courses which are General Courses (Mata Kuliah Umum-MKU) for all students in

Universitas Negeri Jakarta

- b. Faculty Courses feature specific course for Faculty of Mathematics and Natural Science
- c. Study Program Courses features consist of Compulsory Courses and Elective Courses.
- d. Pedagogy course (Mata Kuliah Dasar Kependidikan-MKDK).

Table 4. Groups of Subjects and Workload of Curriculum of Chemistry Education Study Program

No	Types of Courses	Total (In Credits)	Total (In ECTS)
1	University's Courses	14	21
2	Faculty's course	1	1,5
3	Pedagogy's courses	7	10,5
4	Study Program's Compulsory Courses	99	148,5
5	Elective Course	4	6
6	MBKM	20	30
Total		145	217,5

The process of arrangement, implementation, and development of curriculum of FMIPA UNJ has nationally referred to the government policy, and the university policy by UNJ. Besides, it is also supported by various facilities starting from regulations, guidelines, and policies both from the ministry and university. The curriculum development is also maintained by appropriate fundings, learning facilities, organizational activities, monitoring and evaluation as well as its follow-up. The program curriculum has undergone several reviews. These reviews are conducted to ensure the compliance and relevance to the development of science, regulation of the university and professional associations, the suggestions from alumni and stakeholders, and job market requirements.

Chemistry education is an integration of chemistry philosophy and education that unites the characteristics of chemistry and education to produce a body of knowledge from chemistry education. Chemistry education is closely related to the philosophy of chemistry which is related to the characteristics of chemistry. Therefore, the curricula consist of multidiscipline, interdisciplinary, and transdisciplinary approach of chemistry and education and its relevance body knowledge. Chemistry itself as subject knowledge consists of Organic Chemistry, Inorganic Chemistry, Biochemistry, Physical Chemistry, and Analytical Chemistry. Then in the field of education, it consists of curricula, students' characteristics, teaching methodology, learning media, assessment, and evaluation. Therefore, the curricula consist of four cores Subject Matter (SM).

Table 5. Subject Matter (SM) of Chemistry Education Study Program

Code	Subject Matter	Descriptions	Course
SM1	General and Supporting Knowledge	Studies that develop competencies as individuals, professionals, and citizens and globally. A study that facilitates students to have the skills to think, collaborate, communicate, practice, and act scientifically so that they are able to adapt to changes, especially in the field of chemistry education.	<ol style="list-style-type: none"> 1. Religion 2. Pancasila 3. Citizenship 4. Indonesian Language 5. Logic and Scientific Reasoning 6. Big Data and Programming 7. Introduction to Education 8. Olympism 9. English 10. Entrepreneurship 11. Environmental Education 12. Research Methodology 13. Statistics
SM2	Didactic Pedagogy	Studies in the field of education that develop pedagogical didactic skills in planning, implementing, and evaluating learning both in the classroom and in the laboratory. Studies that develop in accordance with advances in science and technology	<ol style="list-style-type: none"> 1. Learners Development 2. Teaching and Learning Theory 3. Basic of Educational 4. Planning and Learning Management 5. Chemistry Curriculum 6. Teaching Methodology 7. Assessment and Evaluation 8. Learning Media 9. HSE (Health Safety and Environment) Laboratory 10. Chemistry Education Seminar
BK3	Mathematics and Basic Science	Studies that describe the basic concepts of science, mathematics, matter, and the basic laws of chemistry in various reactions in solving problems	<ol style="list-style-type: none"> 1. Basic Chemistry I 2. Basic Chemistry II 3. Practicum of Basic chemistry 4. Basic Physics 5. Practicum of Basic Physics 6. General Biology 7. Practicum of General Biology 8. Mathematical Chemistry
BK4	Chemistry	Studies on the basic concepts and applications of chemistry which are divided into Organic Chemistry, Inorganic Chemistry, Physical Chemistry, Analytical Chemistry, Biochemistry, and Environmental Chemistry in a comprehensive based on scientific references.	<ol style="list-style-type: none"> 1. Chemical Thermodynamics 2. Organic Chemistry 3. Practicum of Organic Chemistry 4. Atomic Structure and Structure of Inorganic Compounds 5. Qualitative and Quantitative Chemical Analysis

Code	Subject Matter	Descriptions	Course
			6. Practicum of Qualitative and Quantitative Chemical Analysis 7. Chemical Kinetics 8. Practicum of Physical Chemistry 9. Basic Inorganic Reaction 10. Chemical Separation 11. Organic Compound Reaction 12. Transition Metals and Complex Compounds 13. Practicum of Inorganic Chemistry 14. Structure and Function of Biomolecules 15. Quantum Mechanics 16. Metal and Non-Metal Chemistry 17. Chemistry Analysis Instruments 18. Practicum of Chemistry Analysis Instrumental and Separation 19. Biomolecular Metabolism 20. Practicum of Biochemistry

Chemistry education focus on integrating the content knowledge of Chemistry with pedagogy. Students have experiences in fieldwork in school as pre-service teachers. In the final year, students conduct research as final thesis related to chemistry education. The curriculum structure is based on course classification to achieve Program Learning Outcome (PLO) of each study program. The course descriptions can be seen from the modules, the course structure has its Course Learning Outcomes (CLO) to achieve PLO. Students have opportunity to take obligatory and elective courses, besides new policy of Freedom of Learning which is called Merdeka Belajar Kampus Merdeka-MBKM). Program Learning Outcome (PLO) and all course descriptions (module handbooks) of study program are available on the websites. The curriculum is disseminated in many ways, including a website and Academic Study Guidebook (Buku Pedoman Akademik-BPA) for the bachelor program.

Tabel 6. Curriculum structure mapping towards PLO of Chemistry Education Study Program

Course code	Course Name	CP	ECTS	PLO										
				1	2	3	4	5	6	7	8	9	10	11
Semester 1														
0051142	Indonesian	2	3.0	v										
0051122	Pancasila	2	3.0	v	v									
0053074	Basis of Education	3	4.5		v									
33150023	Basic Chemistry I	3	4.5	v		v								
30055043	Basic Physics	2	3.0	v		v								
32251012	Practicum of basic Physics	1	1.5	v		v						v		
33154031	General Biology	2	3.0	v		v								
33154062	Practicum of General Biology	1	1.5	v		v						v		
33154071	Mathematics Chemistry	3	4.5	v		v								
33150842	Olympism	1	1.5		v									
Total CP		20	30											
Semester 2														
	Introduction to Education	2	3.0	v	v									
0052033	Religion	2	3.0	v										
0052152	Learners Development	2	3.0	v				v						
00051062	Citizenship	2	3.0	v	v									
33151542	Planning and Learning Management	2	3.0	v	v			v						
33150033	Basic Chemistry II	3	4.5	v		v								
	Practicum of Basic Chemistry	2	3.0	v		v						v		
33154143	Environmental education	3	4.5		v							v		
33150312	HSE (Health Safety and Environment) Laboratory	2	3.0	v	v							v		
Total CP		20	33											
Semester 3														
	Big Data and Programming	2	3.0		v				v	v				
0052144	Learn and Learning Theory	2	3.0	v				v		v				
30055053	Atomic structure and structure of inorganic compounds	3	4.5	v			v							
33151324	Organic Chemistry	4	6.0	v			v							
33150933	Chemical Thermodynamics	3	4.5	v			v							
33150893	Qualitative and Quantitative Analysis Chemistry	3	4.5	v			v							
33154212	Practicum of Qualitative and Quantitative Analysis Chemistry	2	3.0	v			v					v		
Total CP		19	31.5											
Semester 4														
	Logic and Scientific Reasoning	3	3.0		v				v					
33154263	Chemistry Curriculum	4.5	4.5		v			v						v
30052012	Learning Methodology	3	3.0		v			v					v	
30055082	Basics of Inorganic Reactions	3	3.0	v			v							
33150983	Chemical Kinetics Reaction	4.5	4.5	v			v							
33250232	Chemical Separation	4.5	4.5	v			v					v		
33250053	Research methodology	4.5	4.5		v				v				v	
33150172	Practicum of organic chemistry	3	3.0	v			v					v		
Total CP		20	33											
Semester 5														

Course code	Course Name	CP	ECTS	PLO										
				1	2	3	4	5	6	7	8	9	10	11
	Assessment and Evaluation	3	4.5		v			v				v		
	Metal and Non-Metal Chemistry	3	4.5	v			v							
33150682	Practicum of Inorganic Chemistry	2	3.0	v			v					v		
	Quantum Mechanics	3	4.5	v			v							
33250343	Structure and Function of Biomolecules	3	4.5	v			v							
33154083	Statistics	3	4.5		v				v			v		
33150041	Practicum of Physical Chemistry	1	1.5	v			v					v		
	Organic Compound Reaction	4	6.0	v			v							
Total CP		22	33											
Semester 6														
33151192	Microteaching	2	3.0	v				v		v				
	Transition Metals and Complex Compounds	2	3.0	v			v							
33250333	Instrumental Chemistry	3	4.5	v			v							
	Practicum of Chemistry Instruments and Separation	2	3.0	v			v					v		
33151093	Biomolecular Metabolism	3	4.5	v			v							
	Practicum of Biochemistry	2	3.0	v			v					v		
33250632	Chemistry Education Seminar	2	3.0		v		v	v	v	v		v		
	Elective Course	4	3.0		v		v	v		v			v	v
Total CP		20	30											
Semester 7														
MBKM														
30052072	PreThesis Seminar	2	3.0		v		v	v	v	v		v		
30055032	Practice Teaching Skills	6	9.0	v			v	v		v	v			v
	University/Elective Courses/MBKM	12	18.0											
Total CP		20	30											
Semester 8														
30054024	Thesis	4	6.0		v		v	v	v	v		v		
Total CP		4	6.0											
TOTAL CREDITS		145	217.5											
Elective Courses														
33150952	Entrepreneurship	3	3.0	v	v									v
33154092	Learning Media	2	3.0		v			v		v				
30050042	English	2	3.0	v	v									
33150012	Medical Biochemistry	2	3.0	v			v							
33150462	Biotechnology	2	3.0	v			v							
33151482	Chemicals of Natural Product	2	3.5	v			v							
33151492	Elucidation Molecular Structure	2	3.0	v			v							
33250362	Nanoscience and Nanotechnology	2	3.0	v			v							
33150282	Polymer Chemistry	2	3.0	v			v							
33150272	Environmental Chemistry	2	3.0	v			v							
33154322	Green Chemistry	2	3.0	v			v							
33151332	History of Chemistry and Chemistry Education	2	3.0		v			v		v				
33151342	Science Learning	2	3.0	v		v		v						
33151392	Science Technology Engineering Mathematics (STEM)	2	3.0		v			v		v				
33154202	Computer	2	3.0		v			v						
33151422	Ethnopedology	2	3.0	v	v			v		v				
33151432	Chemistry for Children with Special Needs	2	3.0	v	v			v		v				
33151452	Qualitative Research Methodology	2	3.0		v					v				
33154302	Learning Environment	2	3.0		v					v				
33154272	Misconceptions in Chemistry Learning	2	3.0		v			v		v				
33154312	Instrument Development	2	3.0		v			v	v	v				

Course code	Course Name	CP	ECTS	PLO											
				1	2	3	4	5	6	7	8	9	10	11	
33151442	ICT in Learning Chemistry	2	3.0		v			v		v					
33151402	Important Concepts in Chemistry	2	3.0		v			v		v					
3151382	School Management	2	3.0	v	v			v		v					
MBKM (20 credits)															
Option 1															
30052072	PreThesis Seminar	2	3.0		v		v	v	v	v		v			
30055032	Practice Teaching Skills	6	18.0	v			v	v		v	v				v
	University Courses	12													
Option 2															
30052072	PreThesis Seminar	2	3.0		v		v	v	v	v		v			
30055032	Practice Teaching Skills	6	18.0	v			v	v		v	v				v
	Elective Courses	12													
Option 3															
30052072	PreThesis Seminar	2	3.0		v		v	v	v	v		v			
30055032	Practice Teaching Skills	6	18.0	v			v	v		v	v				v
	MBKM (8 programme)	12													

The structure and course (module) in Chemistry Education study program consists of 145 credit hours. In study program course consists of compulsory courses of 99 credit hours give general and basic competency for a chemistry bachelor's degree and 7 credit hours for general pedagogy courses. The elective courses that are offered to the students consist of 4 credits hours in addition of 20 credit hours of MBKM and 14 credit hours of general courses. Elective courses are categorized into five interest groups which are Bioscience, Inorganic Chemistry, Physical Chemistry, and Analytical Chemistry, and Pedagogy in Chemistry. In Chemistry Education study program, the curriculum structure has been divided into 4 years program intentions. **First year of study** focuses on basic knowledge of mathematics and natural science, general course and basic philosophy of education which consist of 40 credits courses. **Second year** of study focuses pedagogy courses, chemistry and pedagogy of chemistry which consists of 39 credits courses. **Third year** of study focuses on chemistry and pedagogy of chemistry for a total 42 credits. **Last year** of study consisted of 24 credits to be passed by students which focus on MBKM programme, thesis and elective courses that support the thesis. Each course contributes to PLO in Chemistry Education study program as diagram below. The structure in chemistry education study program based on the regulation in national and university level which combination of chemistry content knowledge and pedagogy.

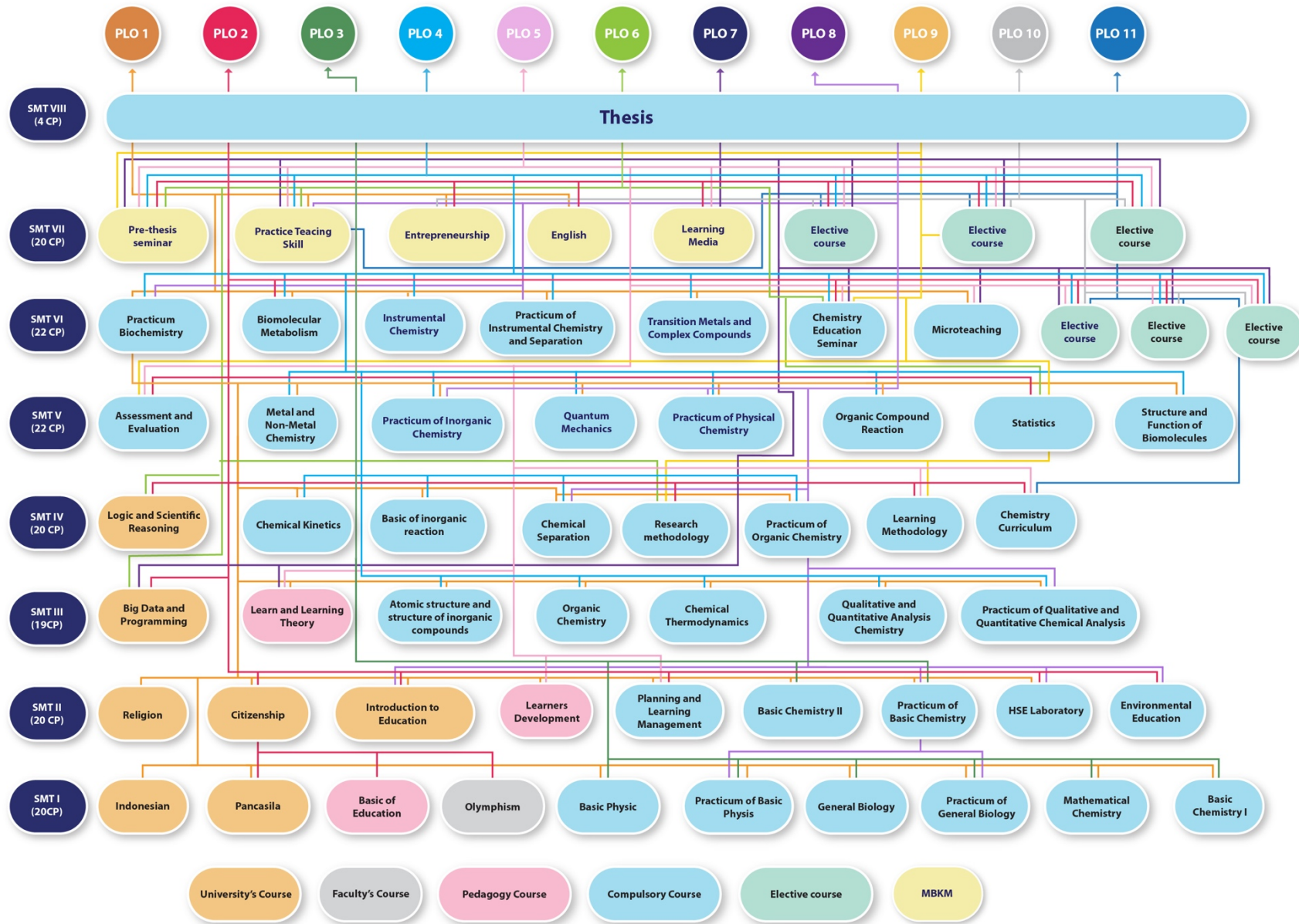


Figure 4. Mapping of Course and PLO in Chemistry Education Study Program