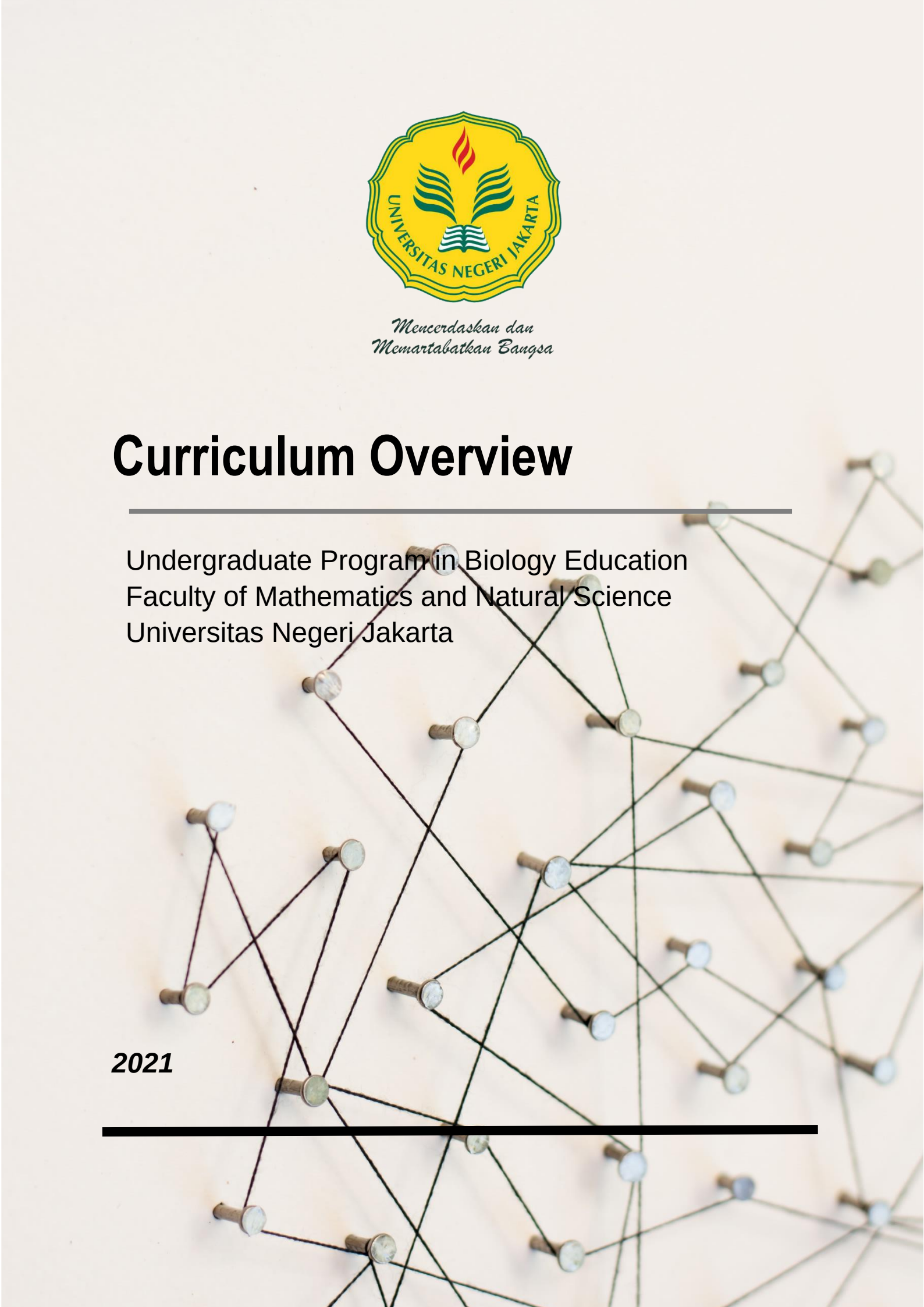
Mencerdaskan dan
Memartabatkan Bangsa

Curriculum Overview

Undergraduate Program in Biology 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 Asian Region

Mission of Universitas Negeri Jakarta

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

The Vision and Mission Objectives of Faculty

Vision of Faculty of Mathematics and Natural Science

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

Mission of Faculty of Mathematics and Natural Science

1. To produce graduates in the field of Mathematics and Natural Sciences education who are professional, able to utilize information and communication technology, have faith and piety, have entrepreneurial skills, according to stakeholder needs, and are able to compete at the ASEAN level.
2. To produce quality scientific works based on research results in the field of Mathematics and Natural Sciences and Mathematics and Natural Sciences education in accordance with the development of science and technology.
3. To produce works of community service in the field of Mathematics and Natural Sciences and Mathematics and Natural Sciences education that can be directly utilized by the community.
4. To establish mutually beneficial cooperation with partner institutions both from within and from abroad, especially those related to the development of FMIPA UNJ

The Vision of Biology Education Program

Vision of Biology Education Program

To become a leading digital technology-based Biology learning reference center in the ASIA region.

B. PROGRAM EDUCATIONAL OBJECTIVES (PEO)

Based on the stated vision of Biology Program and also inline with Faculty as well as University vision and mission, competence profile of Biology Education program are Biology teacher, Biology laboratory manager, and Enterpreneur. The graduates has the ability to:

1. Plan, develop, implement and evaluate biology learning in a professional and globally competitive manner by utilizing digital technology.
2. Manage biology education laboratory by minding safety, occupational health, and environmental aspects according to national and/or international standards.
3. Design, implement and evaluate entrepreneurial activities in the field of biology and biology education.
4. Master professional ethics and responsibility
5. Have the ability to further self-development (life-long learning).

The formulated PEO in Biology Education Study Program has broadly considered from the National Standard of Higher Education (Standar Nasional Pendidikan Tinggi/SNPT) Indonesian Qualification Framework (**IQF** - Kerangka Kualifikasi Nasional Indonesias/KKNI) and the Indonesian Consorsium of Biology (Konsorsium Biologi Indoneisa/KOBI), alumni, professionals and practicians). The PEO also relevance to the 6th level of National Higher Education Standards.

C. PROGRAM LEARNING OUTCOMES (PLO)

The programme offers the students the possibility to acquire required competences that have been set before. Based on this reason, Program Learning Outcome (PLO) is designed in curriculum development, presented in Table 1 below. The PLOs are classified into two areas of social competence and specialist competence.

Table 1. Program Learning Outcomes of Biology Education Study Programme

Area	Code	Program Learning Outcomes
Subject-Specific Competences	PLO 1	Be able to understand the basic concepts of science (basic mathematics, physics, chemistry, and general biology).
	PLO 2	Be able to understand the concept of biology cell and molecular, growing structure, biosystematics and evolution, physiology, genetic and biotechnology, ecology, environment and conservation.
	PLO 3	Be able to implement the strategic management, biology laboratory management, and field study in a unit of education.
	PLO 4	Be able to understand the research procedures and research publication in biology education and biology field of study.

	PLO 5	Be able to solve problems and make decisions on the study of biology cell and molecular, growing structure, biosystematics and evolution, physiology, genetic and biotechnology, ecology, environment and conservation through the implementation of relevant knowledge, method, and technology in multidisciplinary areas of study.
	PLO 6	Be able to manage a biology learning laboratory in the basis of classroom, field, and virtual laboratory.
	PLO 7	Be able to conduct research and publish a research publication in biology education and biology field of study.
General and Social Competences	PLO 8	Show religious attitude, good ethics, social awareness, responsibility, leadership.
	PLO 9	Be able to integrate values, norms, and academic ethics.
	PLO 10	Show some thinking abilities which are conceptual, analytic, logic, critical, creative, and innovative to solve problems.
	PLO 11	Have some abilities in social sensibility, ethics and caring attitude to the society.
	PLO 12	Have some abilities in communication, literation, leadership, and self-development strategy.
	PLO 13	Be able to understand and implement the philosophy of education in *Technological Pedagogical Content Knowledge* (TPACK) learning base.
	PLO 14	Be able to understand working ethics in the biology education field of study.
	PLO 15	Be able to analyze and generate ideas for entrepreneurship program in biology education and biology field of study.
	PLO 16	Be able to implement biology teacher competencies with *Technological Pedagogical Content Knowledge* (TPACK) learning base.
	PLO 17	Be able to understand working ethics in the biology education field of study.
	PLO 18	Be able to design and implement a program of entrepreneurship based on biology education and biology field of study.

The connection can be seen in the figure below to see the relevance between PLO and PEO that has been set.

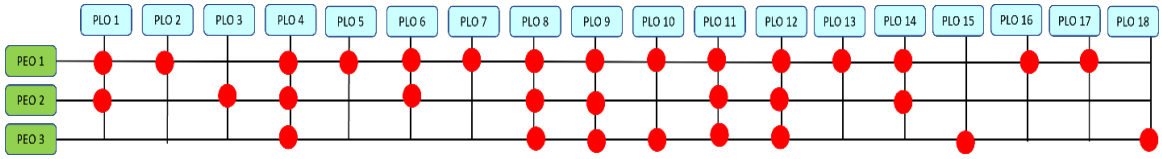


Figure 1. Matrix of PLO and PEO of Biology Education Study Program

The Subject-Specific Criteria (SSC) are given from ASIN SSC 10 about Life Sciences and general and social competences which can be accessed online at https://www.asiin.de/. The SSC is presented in the Table 2 below:

Table 2. Subject Specific Criteria (SSC) of Biology Education Study Program

SSC (Subject-Specific Criteria)		
Graduates of Banchelor's Degree Programmes in the area of the life science	SSC 1	have acquired sound fundamental biology-relevant knowledge of mathematics and the natural sciences
	SSC 2	have sound knowledge of the fundamentals of molecular, cell and organismic biology
	SSC 3	have gained methodological competence in Life Sciences and are also able to apply this in other contexts
	SSC 4	are capable of independent practical work in laboratories and in the field as well as handling organisms
	SSC 5	have relevant knowledge of safety and environmental issues as well as the associated legal fundamentals
	SSC 6	have acquired sound knowledge in at least one special area of Life Sciences
	SSC 7	are capable of recognizing and solving subject-specific problems
	SSC 8	are capable of solving Life Science problems and presenting the results.
	SSC 9	have trained conceptual, analytical and logical thinking

General and Social competences	SSC 10	have an awareness of possible social, ethical and environment-related effects of their actions,
	SSC 11	have acquired communication skills – also in a foreign language – and can communicate scientific information to experts and laypersons in a suitable manner
	SSC 12	have a capacity for teamwork, also on an intercultural basis
	SSC 13	have acquired lifelong learning strategies.

The relevance of PLO and SSC of the Biology Education Study Program is presented in the matrix below.

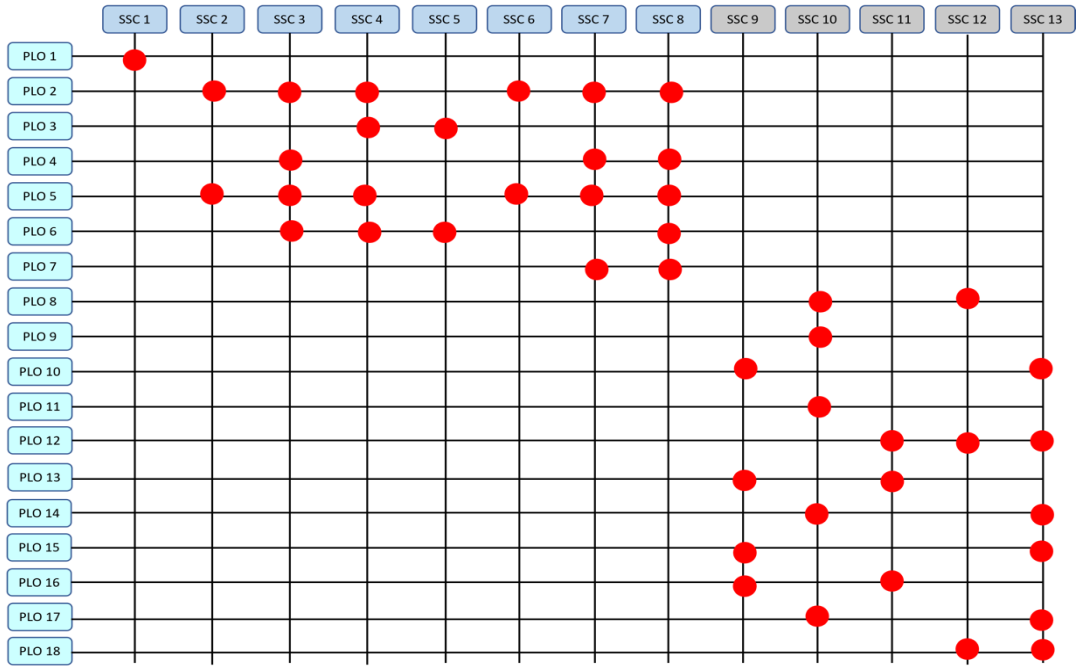


Figure 2. Matrix of PLO and SSC of Biology Education Study Programme

D. PROGRAM STRUCTURE

The curriculum was designed to undergo visions, missions, and goals of Biology Education study Program, Faculty of Mathematics and Natural Sciences (FMIPA), UNJ in terms of generating a graduate as a teacher/an educator in biology who also has the ability to manage a laboratorium as well as entepreneurship according to recent time and stakeholders. The structure of curriculum was arranged in line with Program Learning Outcome (PLO) description which can be found specifically in Table 5. The curriculum mapping figure has explained the relationship between each course

name and course subject of study from Biology Education study program and can be seen in Figure 1.

The curriculum of Biology education was arranged to provide the graduate's need of knowledge and skills in teaching and learning education as well as biology science. Therefore, the curriculum generally has 4 main course subjects, such as the first course subject is to support religious ability, character building education and behavioral sciences; the second course subject is to support abilities and skills in Biology Education; the third course subject is to support professional abilities and special skills in Biology Education; and the fourth course subject is to support entrepreneurship in Biology Education.The specific explanation of relationship between course subjects and course names in the curriculum can be seen in Table 4.

The students of Biology Education Program complete their study in 4 years (8 semesters) length of study as the fastest period, and 7 years (14 semesters) length of study as the longest period. The courses that they have to complete during the study program are minimum 144 credits or equals with 200 ECTS. The course groups include general courses with 15 credits (22,05 ECTS) that are compulsory for all students from the university; basic of education courses with 10 credits (14,7 ECTS) as compulsory courses for students who are in Education program; biology courses with 77 credits (113,19 ECTS); learning courses with 12 credits (17,64 ECTS) to support the students as teachers or educators in biology study program; and elective courses with 30 credits (44,1 ECTS) both in applied biology or professional educational courses. The descriptions of course subjects can be seen in Table 3 as follows:

Table 1.26 Course Groups and Course Weight in Curriculum of Biology Education Study Program

No	Course Groups	Credits	ECTS
1	General Courses (MKU)	14	21
2	Mata Kuliah Fakultas	1	1.5
3	Mata Kuliah Dasar Kependidikan (MKDK)	7	10.5
4	Mata Kuliah Program Studi Wajib	94	141
5	Mata Kuliah Program Studi Pilihan	8-10	12-15
6	MBKM	20	30
JUMLAH		**144-146**	**216-219**

***)** for Education Study Program only

**) total of minimum credits

The body of knowledge of the Biology Education Study Programme is presented in the table below.

Table 1.27 Body of Knowledge of Biology Education Study Programme

Course Category	Subject Matter (SM)		Course Description	Course Name (yang terkait BK)
Religious Skill, Character Building Education, and Behavioural Science	SM 1	Religion, character buikding education and behavioural science	To support the abilities of understanding religions, characters in the society and nationality, and scientific atittudes.	● Religion ● Pancasila ● Philosophy of Natural Science ● Citizenship ● Social Science and Cultures ● Olimphism
Knowledge and Skills in Biology Education Study Program	SM 2	Mathematics and Basic Sciences	To understand the concept of biology and its relations with natural sciences (IPA). There are some courses to support the students to have biology literacy and scientific skills.	● Basic Mathematics ● Basic Physics ● Practicum of Basic Physics ● Basic Chemistry ● General Biology ● Practicum of General Biology
	SM 3	Ocupational Healthy and Safe (K3) and Environmental Science	To understand basic knowledge and skill of laboratorium management and environmental issues.	● Management of Laboratorium ● Education of Environment Science
	SM 4	Scientific Literacy and Communicatio n	To understand the analysis of research information and data (literacy) and communicate it to the public.	● Bahasa Indonesia ● English ● Biology Education Seminar
	SM 5	Biology Cells and Molecules	To understand the structure and fuction of cell membrane, membrane transportation, cell communication, structure and cell organalle function in endomembrane system (endoplasma reticulume and Golgi	● Biochemistry ● Biology Cell

			body), ribosome,mitochondria, cloroplasm, vacuola, and micro body.	
	SM 6	Growing Structure	To understand microscopic structure (histology) and macroscopic (anatomy), and the growth of animal and plant, growing control substance, plant movement, fotopriodism, vernalization, morphology/anatomy of root, stem, leaves, flowers, fruits, seeds, embrios, and sprouts, and also semi-technical description which is distict in several family of plants. This course also discuss about reproduction organs and gametogenesis, fertilization, regeneration and metamorphosis, cleavage, MEE and placenta, control mechanism of core and sitoplasm, and also hormone in organ development, organ development in integument system and its deriviate, muscle system, digestion system, distribution system, respiration	• Animal Growth Structure • Practicum of Animal Growth Structure • Plant Growth Structure • Practicum of Plant Growth Structure

			system, urogenital system, neuron system, sense system, and hormone system as well as comparison of anatomy.	
	SM 7	Biosystemics and Evolutions	To understand botanical variation of cryptogam, taxonomy, systematic, distribution, and utilization. The learning materials include basic of taxonomy; 5 kingdoms classification system; polyfiletisme of cryptogam, phicology, micology, lichenology, bryology, and pteridology; ecology, utilization and conservation of cryptogam members.	● Cryptogam Botanicals ● Practicum of Cryptogam Botanicals ● Fanerogam Botanicals ● Practicum of Fanerogam Botanicals ● Vetebrate Zoology ● Practicum of Vetebrate Zoology ● Avetebrate Zoology ● Practicum of Avetebrate Zoology ● Evolutions
	SM 8	Physiology	To understand the concept of Biomembrane, Bioelectricity, Muscles Contraction, Neuron System and Senses, Hormone System, Bones, Digestion System, Respiration System, Sirculation System, Ecretion System and Osmoregulation, ReproductionSystem and Termoregulation.	● Animal Physiology ● Practicum of Animal Physiology ● Human Anatomy Physiology ● Practicum of Human Anatomy Physiology ● Plant Physiology ● Practicum of Plant Physiology

	SM 9	Genetics and Biotechnology	To understand molecular genetics, such as: genetics material, regulation of gene expression, mutation, cancer, and classical genetics: heredity, mendelism, probability and Chi Square statistic analysis, allelic and gene interaction, gender determination, gene embedded sexs,linkage, cross movement and chromosome map, extranucleus gene fenotipic, and popuation genetics.	● Genetics ● Practicum of Genetics ● Microbiology ● Practicum of Microbiology
	SM 10	Ecology and Environment	To understand ecology concepts along with their ecosystem obstacles including internal interaction in micro or macro scales.	● Ecology ● Practicum of Ecology ● Excursion Study
	SM 11	Foundation of Biology Education	To prepare the students at understanding and implementing philosophy, basic principal of education, especially Biology, such as learning theories, students development, planning, implementation and learning evaluation.	● Foundation of Education ● Students Development ● Theory of Learning and Teaching ● Currriculum Analysis ● Learning Methodology ● Learning Plan and Evaluation
Professional Ability and Specific Skill in	SM 12	Professional Skills in	To understand the skills for teacher candidates who is able to apply the	● Educator and Educational Staff Profession

Biology Education		Biology Education	learning theory and practicum of education in laboratorium and classroom so that they are going to be professional teachers.	● Learning Competency Development ● School Management and Development
	SM 13	Laboratorium Management	To undertand the foundation of law in Biology Laboratorium for High School, working safety in laboratorium, laboratorium tools and materials management, laboratorium administration, tools and material procurement, biology laboratorium design for High School laboratorium observation of laboratorium, and future development of biology laboratorium for High School	● Universal Data and Programming ● Excursion Study ● Biotechnology
	SM 14	Penelitian dan publikasi ilmiah	To review basic concept of statistics and research in education, research paper writing techniques (APA, Vancouver and Turabian style), Mendeley application, SPSS application, Turnitin application, plagiarism, national and international research journal, predator	● Logic and scientific analysis ● Fundamental Statictics ● Reaseach Methodology ● Pra-Thesis Seminar ● Thesis

			journal, scientific writing projects.	
Entepreneurships	SM 15	Management and Entepreneurship	To review some courses, such as: foundation of management, school management, strategic management, history of entepreneurship, and supporting factor of entepreneurship.	● Biology and Microbiology Based Entepreneurship ● Applied Microbiology

Table 1.28 Matrix between CLO and PLO of Biology Education Study Programme

Course code	Course Name	CP	ECTS	PLO																	
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Semester 1																					
34155302	Pancasila	2	3.0								v	v		v							
51132	Indonesian language	2	3.0								v				v						
34155342	Foundation of Education	2	3.0													v				v	
34150012	Basic Mathematics	2	3.0	v																	
34155011	English	1	1.5																		
34150422	Basic Chemistry	2	3.0	v																	
34151461	Basic Biology	2	3.0	v	v			v													

34155 302	Basic Biology Practicum	1	1.5			v		v	v												
51132	Basic Physic	2	3.0	v																	
34155 342	Basic Physic Practicum	2	3.0			v			v												
	Olympism	1	1.5			v															
	Total CP	**19**	**28.5**																		
Semester 2																					
52033	Religion	3	4.5								v	v									
52102	Learner Development	2	3.0														v			v	
34155 172	Plant Structure and Development	2	3.0		v			v													
34155 181	Plant Structure and Development Practicum	1	1.5			v		v	v												
34155 152	Animal Structure and Development	2	3.0		v			v													
34155 161	Animal Structure and Development Practicum	1	1.5			v		v	v												
34150 122	Biochemistry	2	3.0		v			v													

34154991	Biochemistry Practicum	1	1.5			v		v	v												
30051102	Philosophy of Natural Sciences	2	3.0										v			v					
51112	Civic Education	2	3.0								v	v		v							
	Elective (1 course)	2	3.0																		
	Total CP	**20**	**27**																		
Semester 3																					
52144	Learning and Instructional Theories	4	3.0													v			v	v	
34150842	Basic Statistics	2	3.0				v						v								
34150562	Cell Biology	2	3.0		v			v													
34155312	Cryptogamic Botany	2	3.0		v			v													
34155321	Cryptogamic Botany Practicum	1	1.5			v		v	v												
34155332	Environmental Education	2	3.0		v			v						v							

34155 062	A vertebrate Zoology	2	3.0		v			v													
34155 071	A vertebrate Zoology Practicum	1	1.5			v		v	v												
	Elective (3 courses)	6	9.0																		
	Total CP	**22**	**33**																		
Semester 4																					
34155 132	Genetic	2	3.0		v			v										v		v	v
34155 082	Vertebrate Zoology	2	3.0		v			v													
34155 091	Vertebrate Zoology Practicum	1	1.5			v		v	v												
34155 022	Phanerogamic Botany	2	3.0		v			v													
34155 031	Phanerogamic Botany Practicum	1	1.5			v		v	v												
34151 122	Research Methodology	2	3.0				v					v									
30052 012	Teaching Methodology	2	3.0									v				v					

34153 022	Animal Physiology	2	3.0		v			v												
34155 101	Animal Physiology Practicum	1	1.5			v		v	v											
34155 112	Plant Physiology	2	3.0		v			v												
34155 121	Plant Physiology Practicum	1	1.5			v		v	v											
34155 141	Genetic Practicum	1	1.5			v		v	v											
	Elective (1 course)	2	3.0																	
	Total CP	**21**	**31.5**																	
Semester 5																				
30052 022	Instructional Planning, Management, and Evaluation	2	3.0									v				v				
34155 192	Microbiology	2	3.0		v			v												v
34155 201	Microbiology Practicum	1	1.5			v		v	v											v
34150 182	Human Anatomy and Physiology	2	3.0		v			v												

34154981	Human Anatomy and Physiology Practicum	1	1.5			v		v	v												
34150632	Ecology	2	3.0		v			v													
34155051	Ecology Practicum	1	1.5			v		v	v												
34150192	Evolution	2	3.0		v			v													
	Elective (3-4 courses)	6-8	9.0-12.0																		
	Total CP	**19-21**	**28.5-31.5**																		
Semester 6																					
34153212	Seminar on Biology Education	2	3.0				v					v									
34152092	Excursion Study	2	3.0			v	v	v	v	v		v	v								
34152112	Teaching Competency Development	2	3.0												v	v	v		v	v	
34154012	Seminar on Pre-Undergraduate Thesis	2	3.0														v				

	Elective (6 courses)	12	18.0																		
Total CP		**20**	**30**																		
Semester 7																					
30054062	Pre-Thesis Seminar	2	3.0				v			v		v									
34155362	School Environment Practice	6	9.0				v			v		v									
	Elective (6 courses)	12	18.0																		
Total CP		**20**	**21**																		
Semester 8																					
	Undergraduate Thesis	4	6.0				v			v											
Total CP		**4**	**6.0**																		
TOTAL CREDITS		**144-146**	**216-219**																		
Elective Courses																					
34150262	Education of Family Life (PK2)	2	3.0		v			v													
34154312	Nutrion snd Health Science	2	3.0		v			v													

34150432	Histology	2	3.0		v			v												
30051121	Olympism	2	3.0									v		v	v					
34155222	Character Building Education	2	3.0									v		v	v					
34251352	KUBB	2	3.0															v			v
34250982	Plant Anatomy	2	3.0		v			v												
34151342	Plant Microtechnic	2	3.0			v		v	v									v			v
34154812	Visual Audio Media	2	3.0														v	v	v		
34153092	Parasitology	2	3.0		v			v												
34150312	Entomology	2	3.0		v			v												
34154912	Foundations of Bioinformatics	2	3.0				v								v			v		

34151 362	Natural Science Learning	2	3.0												v			v	v	
34154 112	Bioconservation	2	3.0		v			v						v							
34150 302	Endocrinology	2	3.0		v			v													
34154 352	Immunology	2	3.0		v			v													
34152 102	Tropical Forest Ecology	2	3.0		v			v													
34153 142	Scientific Publications	2	3.0				v					v									
34151 442	Instrcutional Designs	2	3.0														v		v		
34153 152	Learning Innovations	2	3.0														v		v		
34151 452	Biology Learning Instruments	2	3.0														v		v		
34154 562	Classroom Based Study	2	3.0				v					v			v		v				

34153222	Geographic System of Information	2	3.0					v												
34154552	AMDAL	2	3.0		v			v												
34154512	Lymonology	2	3.0		v			v												
34154482	Ocean Ecology	2	3.0		v			v												
34153132	Biodiversity	2	3.0		v			v												
34153192	Applied Microbio for School	2	3.0					v									v			
34150382	Enzymology	2	3.0		v			v												
34151432	Fitrochemistry	2	3.0		v			v												
34154572	Learning Evaluation	2	3.0													v		v		
34154932	Primatology	2	3.0		v			v												

34154902	Reasearch Development	2	3.0				v												v	v	
34154922	Biology Learning Technology	2	3.0														v		v		
34153192	Reproduction Biology	2	3.0		v			v													
34155282	Digital Learning	2	3.0														v		v		

E. Structure and Module of Biology Education Study Programme

The structure and course (module) in Biology Education study program consists of 144-146 credit hours. The compulsory courses of 93 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 two interest groups which are Biology and Pedagogy in Biology. In Biology 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 courses and basic philosophy of education which consist of 41 credits courses. **Second year** of study focuses on pedagogy course, Biology, and pedagogy of Biology which consists of 40 credits courses. **Third year** of study focuses on Biology and Pedagogy of Biology for a total 41 credits. The **Last year of study** consists of 24 credits to be passed by students which focus on thesis and elective courses that support the thesis. Each course contributes to PLO in Biology Education. Each course contributes to PLO in Biology Education study program as diagram 1

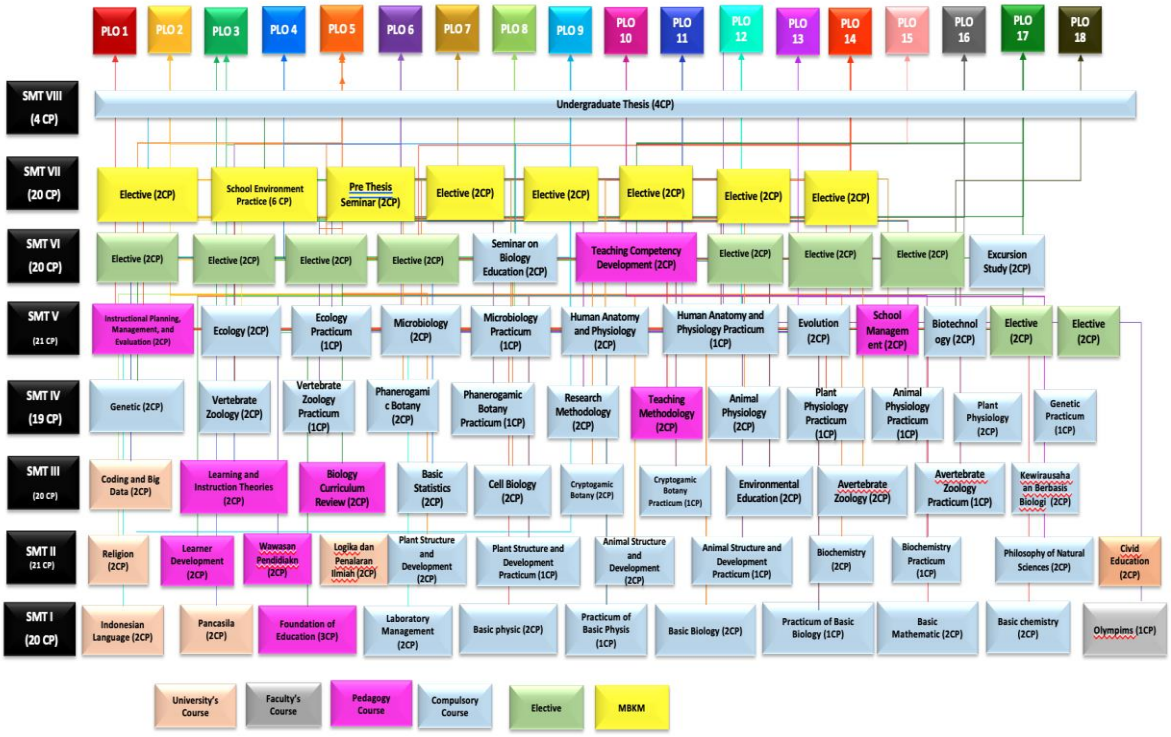


Figure 1. Course mapping based of Courses and PLO in Biology Education Study Program

Program Learning Outcome (PLO) and all courses descriptions (module handbooks) from the Biology Education study program are available on the website: https://fmipa.unj.ac.id/pbiologi/.