Mencerdaskan dan
Memartabatkan Bangsa

Curriculum Overview

Bachelor's Program in Biology
Faculty of Mathematics and Natural Science
Universitas Negeri Jakarta

2022

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 Program

Vision of Biology Program

To become a center for learning and research Biology at the ASIAN level that focuses on biodiversity and conservation.

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 program are scientists and academics, practitioner in laboratory and industry in biology field focussing in biodiversity and conservation. Detail of competence profiles are as follow:

a. Subject-Specific Competences

- Graduates who have acknowledged concepts in fundamental biology, fundamentals of molecular and cell organisms, and other related fields. Graduate who are able to utilize their knowledge and skills based on research methodology to solve a problem on latest issues in biology

b. General and Social Competences

- Graduates who have good ethics, have trained analytical and logical thinking
- Graduates who have good communication skills and network
- Graduates who have ability in managing sources with good leadership. Active hands-on life-long learners

Qualification profiles are objected to be (a) **Scientists and academics**, who are able to design, develop research in the laboratory and field, transfer their knowledge and promote themselves for further study; and (b) **Practitioners in laboratory and industry**, who are able to manage, analyze, make decisions on data given, carry their duty responsibly, have rigid laboratory safety standards including occupational health and safety concepts with excellent communication, good problem-solving skills, and good understanding in ethics. Based on the graduate's profiles and competencies, the Program Education Objectives are designed as follows:

1. Be able to acknowledge basic mathematics and natural sciences, fundamental biology, molecular and cell organisms, and other related fields.
2. Be able to utilize their knowledge and skills based on research methodology to solve a problem on biology and other related issues.
3. Be able to communicate in teamwork to collaborate and create networking.
4. Be able to have good ethics in the academic, social, and environmental context.
5. Be able to develop knowledge for further study and work needs as a long-life learner.

The formulated PEO in Biology Studi 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)

Competence profiles of Biology programs are set to answer the future challenges on the need of the careers mentioned. PLO are designed in curriculum development. As stakeholders are an important part of the process, they are invited to provide input regarding the need of graduates in the job market. PLO of Biology Program, Universitas Negeri Jakarta, as well as other bachelor program in Indonesia is organize based on level 6 of Indonesian Qualification Framework (IQF) which include as follow:

1. Able to apply their expertise and use science, technology and/or the art of problem solving in the field and able to adapt faced situations.
2. Master theoretical concepts in general knowledge and theoretical concepts in a specialized field in-depth as well as able to formulate a procedural problem solving.
3. Able to make the right decisions based on the analysis of information and data, and able to provide guidance in selecting various alternative solutions independently and in a group.
4. Have responsibility for his/her own accountable work.

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. The PLO/ILO of the program can be accessed in https://fmipa.unj.ac.id/biologi/.

Table 1. Program Learning Outcomes of Biology Study Programme

Area	Code	Program Learning Outcome
Social Competence	PLO1	To show religious attitude, good ethics, social awareness, responsibility, leadership.
	PLO 2	Be able to apply logical, critical, systematic, innovative, scientific thinking and methods in solving problems in biology and other related fields.
	PLO 3	Be able to show good communication skills in social and academic context, disseminate scientific information communicatively and responsibly concerning cultural environments, build networks and collaboration.

Specialist competences	PLO 4	Be able to understand the concepts and applications of basic mathematics and natural sciences.
	PLO 5	Be able to acquire knowledge of cellular and molecular biology, physiology, genetics, structure and development, biosystematics and biodiversity, evolution, ecology comprehensively and suitably.
	PLO 6	Be able to acquire other relevant knowledge in an integrated and sustainable manner.
	PLO 7	Be able to apply the scientific method in solving a problem in biology and other relevant contexts which includes approach in big data analysis.
	PLO 8	Be able to apply biological knowledge in designing and producing creative and innovative products continuously.
	PLO 9	Be able to plan, manage, apply and evaluate laboratory and field tasks independently with consideration on health and environmental safety.

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

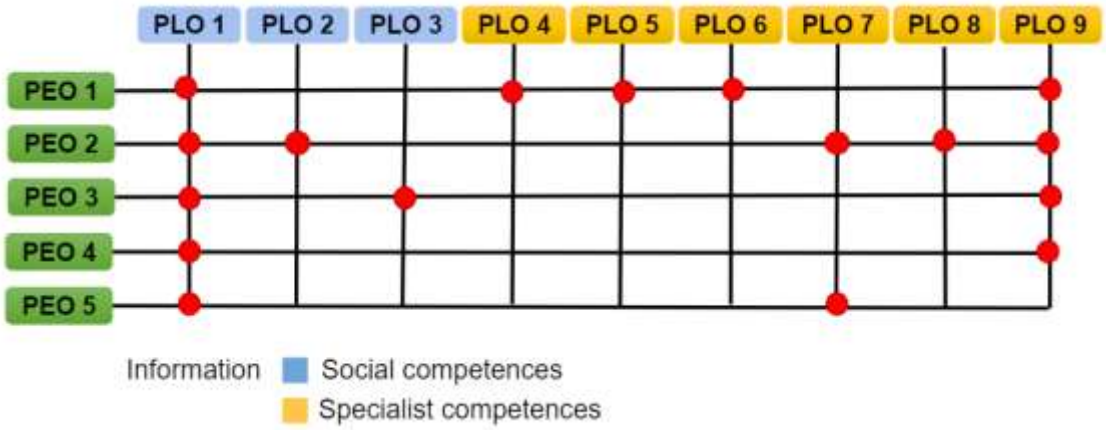

Figure 1. Matrix of PLO and PEO of Biology Study Program

The Subject-Specific Criteria (SSC) are given from ASIN SSC 10 about Life Sciences, 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 Study Program

SSC (Subject-Specific Criteria)		
Subject-specific competences	**SSC 1**	Have acquired sound fundamental biology-relevant knowledge of mathematics and the natural sciences
	SSC 2	Have comprehensive 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 Sciences problems and presenting the results
General and Social Competences	**SSC 9**	Have trained conceptual, analytical and logical thinking
	SSC10	Have an awareness of possible social, ethical and environment-related effects of their actions
	SSC11	Have acquired communication skills –also in foreign language– and can communicate scientific information to experts and laypersons in a suitable manner
	SSC12	Have a capacity for teamwork, also on an intercultural basis
	SSC13	Have acquired lifelong learning strategies

Instead of being correlated with PEO, PLO that has been set also have to be in line with SSC ASIIN 10 of life Sciences. This ensures that the competencies developed have been designed to meet the Subject Specific Criteria (SSC) that has been set in ASIIN. Thus, competences required in ASIIN can be achieved. The relevance between PLO and SSC of the Biology Study Program is described in the matrix below.

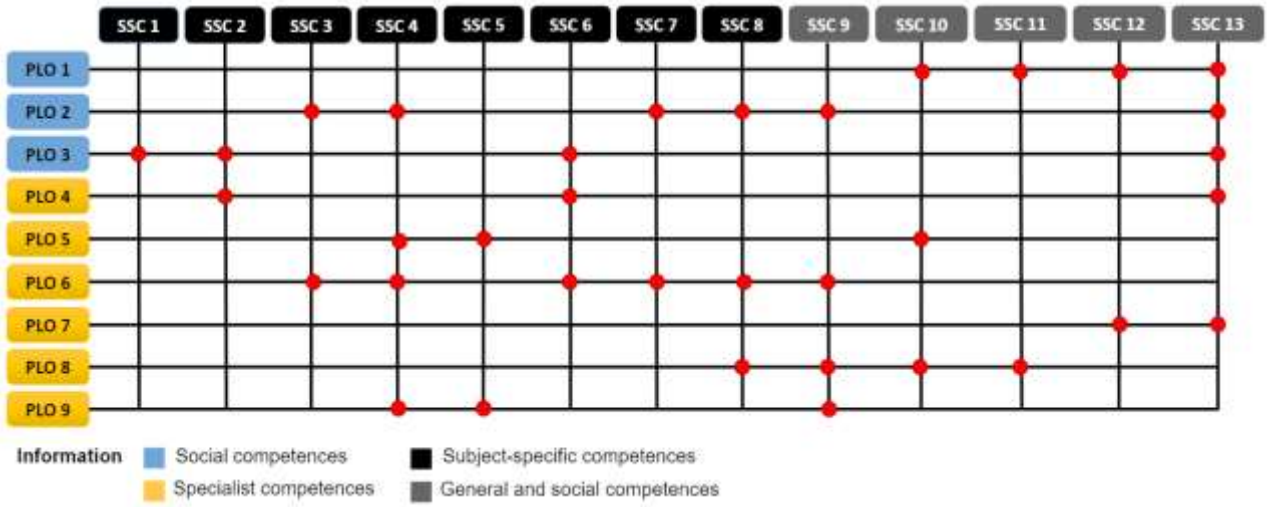

Figure 2. Matrix of PLO and SSC of Biology Study Programme

D. PROGRAM STRUCTURE

The present curriculum applied by the Bachelor of Biology program is the 2013 curriculum (Revised version of 2006 curriculum). Curriculum was developed by the Higher education ministry of research and technology Indonesia Number 44, 2015. Curriculum updates and improvement development were designed regarding IQF, graduates, National standard of higher education, Biology Consortium of Indonesia considering orientation changes of 4.0 industrial era and OBE. The curriculum was arranged based on the Learning outcome that has been set before. Program outcomes are also designed to meet the development of science, technology and global culture that cannot be separated from the development of the capacity potential of human resources owned by the biology program.

The curriculum is developed through a series of processes from the body of knowledge up to curriculum structure. The curriculum structure will guide students to achieve competencies that have been set and meet the PLO of Biology Program. Intended competencies that students can acquire after taking one course can be seen from the course module. Courses are designed from the core subject matter. Table 3 below describes the subject matter and course in the biology program.

Table 3. Body of Knowledge of Biology Study Programme

Code	Body of Knoelwdge (BoK)	Course Review Description	Course Name (relevant with BoK)
BK1	CELL AND MOLECULAR BIOLOGY	Study materials include biochemistry, cell biology, and molecular biology to understand the structure and function of cells. Cell biology study is related to the structure and function of eukaryotic cells, biosynthesis of cellular membranes and organelles, cell growth, transport, receptors, and cell signaling, cytoskeleton, extracellular matrix, chromosomal structure, concepts of DNA, RNA, and DNA synthesis. Molecular Biology considers prokaryotic genetic recombination, transcription from DNA to RNA, protein translation. Control of genes expression in prokaryotes and eukaryotes. Basic Molecular Technique-DNA Isolation. Genetic Markers (Hybridization, PCR, Sequence)	**Compulsory course:** Biochemistry and Organic chemistry, Cell Biology and Molecular Biology **Elective courses:** Bacteriology, Bakteriologi, Biology of Yeast, Enzymology, Proteomic
BK2	PHYSIOLOGY	The study material is in the field of animal and plant physiology. Animal physiology course discusses the principles, processes, and mechanisms involved in biological function in animals, the cellular basis of animal physiology with consideration on the physiology of homeostasis, the endocrine and reproductive system, osmoregulatory, and digest system in the animal. This plant physiology course discusses an introduction to the structure of plant biomolecules, plant	**Compulsory course:** Plant Physiology, Animal Physiology **Elective courses:** Animal Bioreproduction, Human Biology, Immunology, Ecto dan Endoparasyt, Animal Endocrinology,

		metabolism, and the physiological processes that underlie germination of seeds, plant growth and development, and the response of plants to the environment.	Laboratory Animal Management
BK3	GENETICS	Genetics course discusses the fundamental principles of inheritance at cellular, organismal, and population levels. It is a study of how physical characters are inherited and how chemical structures affect those characters and passed to the offspring. This field also studies DNA as the genetic material of an organism, synthesis protein and how material genetics and environmental controls phenotypic characters of organisms, and how changes in the DNA sequence cause of mutation result in variation within individuals and populations of species, leading towards evolutionary changes. It is also introducing plasmid recombinant technology that utilizes biological systems, living organisms or parts of this to develop or create different products.	**Compulsory course:** Genetics, Biotechnology **Elective courses:** Population Genetics, Conseravation Genetics, Animal Biotechnology, Plant Biotechnology, Reproduction and Plant Breeding
BK4	STRUCTURE AND DEVELOPMENT (PLANT AND ANIMAL)	Study materials include plant and animal structures and development. The study material for plants discusses the external (morphology) and internal (anatomy) structures and development of higher plants. It also discusses development of the primary and secondary structure of plants. Plant growth and development in the vegetative and generative phases. Embryogenesis and organogenesis of the plant. The study material for the structure and development of animals discusses the histological structure of fundamental tissues and specific tissues that make up an animal organ and explains the internal structures and processes of the formation and development of various organ systems in vertebrates. The development of animals also discusses the transitional or indirect stages of development in some vertebrates, mechanisms of metamorphosis, and regeneration.	**Compulsory course:** Plant Structure anad Development, Animal Structure and Development, Plant Tissue Culture, Microbiology **Elective courses:** Animal Histology, Animal Microtechnique, Teratology, Plant Microtechnique, Botany Economic, Urban Biodiversity, Principals of Horticultura, Plant Microbial Pathogens
BK5	BIOSYSTEMATIC AND EVOLUTION	Biosystematics is the study of the diversification of organisms and the relationships between these organisms. Biosystematics includes the subdisciplines of taxonomy and systematics. Taxonomy includes discovery of species and recognition, identification, diagnosis, comparison, classification, and naming. Systematics studies the evolutionary relationships between species and higher taxonomic units (such as genera and families) in an evolutionary relation. The biology systematics also discussed the biodiversity of	**Compulsory course:** Biodiversity and Systematics of the Cryptograms, Biodiversity and Systematics of the Phanerogams, Biodiversity and Systematics of the Vertebrate, Biodiversity and Systematics of the Invertebrate, Evolusi.

		living things, including plants (cryptogam and phanerogams), animals (vertebrate and invertebrate), bacteria, algae, and fungi as well as their implementation in the classification of living things and their conservation aspects.	**Elective courses:** Biodiversity of Fungi, Biosistematic of Microorganisma, Phucology, Orchidology, Pteridology
BK6	ECOLOGY	Ecology is the study of the interactions between organisms and their environment. Ecological is a biological science that studies the interactions between living things and other living things and the surrounding environment. This course provides a background in the principles of ecological science, concepts of natural selection, population and community ecology, biodiversity, and sustainability. The constantly changing environment also encourages living organisms to continue to adapt. This study, it is also discussing various natural resources in the environment and their management	**Compulsory courses:** Environmental Sciences, Findamentals of Ecology, Field Works. **Elective courses:** Animal Ecology, Plant Ecology, Ornitology, Biogeography, Lymnology, Envoronmental Microbiology, Plant Ecopphysiology, AMDAL
BK7	DATA ANALYSIS	The focus of the study is the use of several tools for data analysis of scientific research in plants, animals, microbiology, and related fields of science. This study also discusses descriptive and experimental methods and designs for scientific research. How to analytical techniques and dissemination of the results obtained in the final project.	**Compulsory course:** Basic Mathematics, Basic Statistics, Biological Research Methodology, Research Design, Internship program, Field works, Thesis **Elective courses:** Fundamentasl of Bioinformatics
BK8	MANAGEMENT BASED ON BIOLOGY	This subject matter covers the material on how to organize works in laboratory, manage works in various fields related to biological products and write report for the final project	**Compulsory course:** Occupational and Health Safety, Enterpreneurship in Biology, Techniques on Scientific Writing, Seminar on research proposal **Elective courses:** Animal Bioetic

The learning process conducted in the form of lecture activities in the classroom, laboratory and outside the classroom in the field area includes internship partners of industry and research boards. During last 3 years, classroom activities are not only involved the class organized by biology program, mathematic and natural science faculty, Universitas Neger Jakarta, but also other open class from other institution as form of Indonesian freedom to learn. Some partner universities were incorporated in the PERMATA SAKTI and PERMATA AMLI program, University to university agreements with Universitas Indonesia, Universitas Jenderal Soedirman, and Universitas Padjadjaran. Students are

allowed to have 20 up to 40 credits from classes of other Universities in 1 (one) - 2 (two) semester.

Total number of credits required for the compulsory subject is 144-147 credits with 7 up to 14 semester lengths. Courses are categorized into 14 of general courses, 93 of basic skills courses and 37 courses in the field of expertise and support. The elective courses that are offered to the students consist of 17 credit-hours in addition of 20 credit hours of MBKM and 14 credit hours of general courses. Elective courses are categorized into four (4) interest groups, namely plant science, animal science, ecology and multidiscipline. In Biology study program, the curriculum structure has been divided into 4 years program intentions. One credit is equal to 170 minutes of learning activities in a week for one semester. One semester consists of 16 meetings including mid-test and final tests. Credit calculation is presented in Table 4 below. The curriculum structure is designed in 4 major Courses: General Courses – National Compulsory and University Compulsory (14 credits), Basic Skills Course (93 credits), Study Program Elective Courses (17 credits); Independent Learning Activities Course (MBKM) (20 credits).

Table 4. Groups of Subject and Workload of Curriculum of Biology Study Program

No	Courses Group	Credi	ECTS
1	General Courses – National Compulsory and University Compulsory	14	21
2	Basic Skills Compulsory Course from Biology Study Program	93	139.5
3	Elective Courses		
4	Study Program Elective Courses	17-20	25.5-30
5	Independent Learning Activities Course (MBKM)	20	30
Total		144-147	216-220.5

Note: 1 credit (50 minutes of structured learning, 60 minutes of structured assignment, 60 minutes of independent learning) equal to 1.5 ECTS

First year of study focuses on basic knowledge of mathematics and natural science consist of 39 credits courses. Second year of study focuses on statistics, biodiversity and biosystematics of plant, animal and microbes which consists of 43 credits courses. Third year of study focuses on animal and plant physiology, molecular biology and research design for total 44 credits. Last year of study consists of 19 credits to be passed by students which focus on thesis and elective courses that support the thesis. Each course contributes to PLO in Biology study program as in Figure 3.

A review of the suitability of the curriculum and its implementation is carried out in the form of curriculum monitoring and evaluation activities which are carried out at the end of the semester and monitoring and evaluation of learning in the middle of the semester (8th week of lecture). Both internal monitoring and evaluation activities were carried out by quality assurance groups of the Department, Faculty and University (GPJM). Learning processes are also scored

and valued by students through Lecturers' evaluation which will directly inform every lecturer after the course.

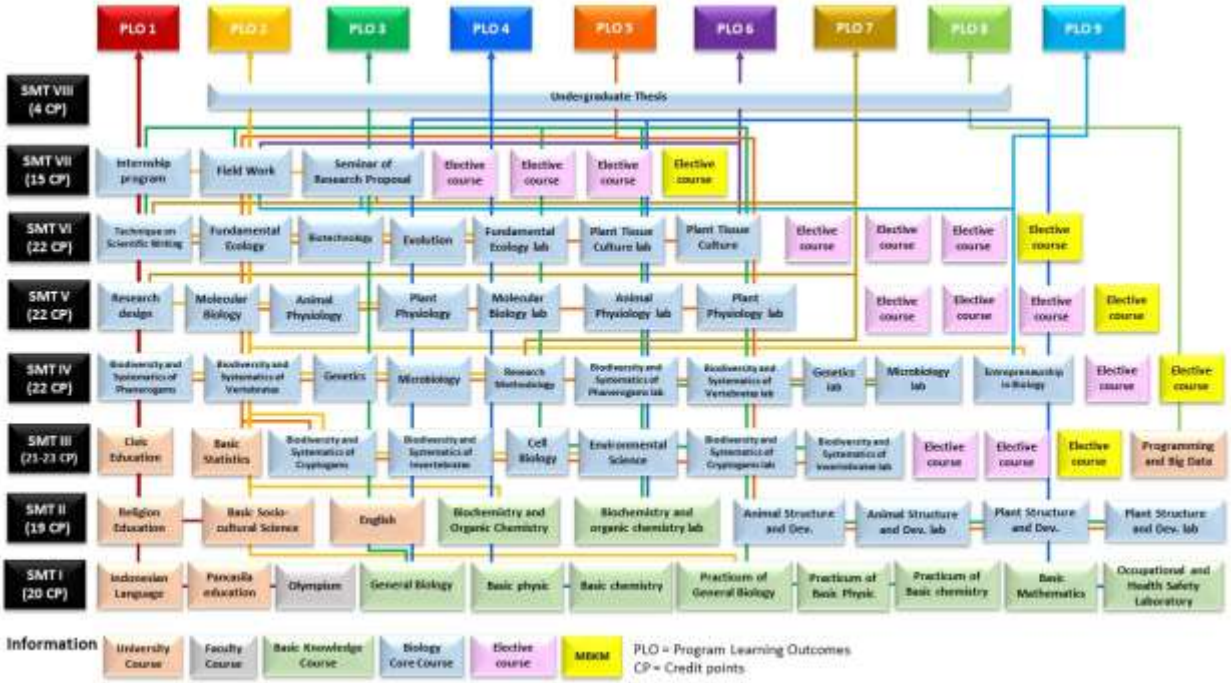

Figure 3. Course mapping based of Courses and PLO in Biology Study Program

To guarantee that the students understand about program learning outcomes of degree programs and courses, module handbooks will be given by the respective lecturer in the beginning of the course meeting as a contract. The description of learning goal courses has been written in the module. The module handbooks are available in Appendix 3. The module is used as help to describe knowledge, skills and competences acquired in the courses. The description of learning outcomes of the courses has been written by lecturers of respective courses.

Table 5. Matrix between Course Learning Outcomes (CLO) and Program Learning Outcomes (PLO) of Biology Study Program

Course code	Course Name	CP	ECTS	PLO								
				1	2	3	4	5	6	7	8	9
Semester 1												
30050062	Indonesian Language	2	3.0	v								
30051121	Olympism	1	1.5	v								
51112	Pancasila	2	3.0	v								
34251632	General Biology	3	4.5			v	v					
34251641	Practicum of General Biology	1	1.5		v	v						
32251012	Basic Physics	2	3.0				v					
32251021	Basic Physics practicum	1	1.5			v						
34251512	Occupational and Health Safety	2	3.0				v					
34251652	Basic Chemistry	2	3.0				v					

34251661	Practicum of Basic Chemistry	1	1.5			v						
34250093	Basic Mathematics	3	4.5				v					
	Total CP	**20**	**30**									
Semester 2												
52033	Religion Education	3	4.5	v								
51262	Basic Social and Cultural Sciences	2	3.0	v								
34250862	English for Biology 1	2	3.0			v						
34251673	Biochemistry and Organic Chemistry	3	4.5		v		v					
34251681	Practicum of Biochemistry and Organic Chemistry	1	1.5			v	v					
34251693	Animal Structure and Development	3	3.0			v		v				
34251701	Practicum of Animal Structure and Development	1	1.5			v		v				
34251713	Plant Structure and Development	3	4.5			v		v				
34251721	Practicum of Plant Structure and Development	1	1.5			v		v				
	Total CP	**19**	**28.5**									
Semester 3												
51062	Civic Education	2	3.0	v								
34251732	Biodiversity and Systematics of the Cryptograms	2	3.0		v			v				
34251741	Practicum of Biodiversity and Systematics Cryptograms	1	1.5			v		v				
34251752	Biodiversity and Systematics of Invertebrates	2	3.0		v			v				
34251761	Practicum of Biodiversity and Systematics Invertebrates	1	1.5			v		v				
34250603	Cell Biology	3	4.5		v			v				
34250013	Environmental Science	3	4.5		v	v		v				
34250142	Basic statistics	2	3.0		v		v					
	Introduction to Programming and Big Data	2	3.0								v	
	Elective courses (2 courses)	4	9.0									
	Total CP	**22**	**23.5**									
Elective courses												
34251412	1.Human Biology	2	3.0		v				v			
34251132	2.Nutrition and Health	2	3.0		v				v			
34250822	3.Animal Bioethics	2	3.0	v					v			
34251502	4.Animal Behavior	2	3.0			v			v			
34250462	5.Mycology	2	3.0		v			v				
	6.Phycology	2	3.0		v			v				
34251523	7.Fundamentals of Horticulture	3	4.5		v	v		v				
Semester 4												
34251772	Biodiversity and Systematics of Phanerogams	2	3.0		v			v				
34251781	Practicum of Biodiversity and Systematics Phanerogams	1	1.5			v		v				
34251842	Biodiversity and Systematics of Vertebrate	2	3.0		v			v				
34251851	Practicum of Biodiversity and Systematics Vertebrate	1	1.5			v		v				
34251793	Genetics	3	4.5		v			v				
34251801	Practicum of Genetics	1	1.5			v		v				
34251822	Microbiology	2	3.0		v			v				
34251831	Practicum of Microbiology	1	1.5			v		v			v	
34251812	Research Methodology of Biology	2	3.0		v					v		
34251373	Entrepreneurship in Biology	3	4.5		v							v
	Elective courses (2 courses)	4	6.0									
	Total CP	**22**	**33**									
Elective courses												

34250662	1.Pteridology	2	3.0					v				v
	2.Bryology	2	3.0					v				v
34250532	3.Economic Botany	2	3.0						v		v	
	4.Orchidology	2	3.0		v				v			v
34251492	5.Histology	2	3.0						v			
Semester 5												
34250812	Research design	2	3.0		v					v		
34251862	Molecular Biology	2	3.0		v			v				
34252051	Practicum of Molecular Biology	1	1.5				v	v				
34251893	Animal Physiology	3	4.5		v			v				
34251901	Practicum of Animal Physiology	1	1.5			v		v				
34251913	Plant Physiology	3	4.5		v			v				
34251921	Practicum of Plant Physiology	1	1.5			v		v				v
	Elective courses (3-4 courses)	9	13.5									
	Total CP	**22**	**33**									
Elective courses												
34251523	1.Microbial Plant Pathogen	3	4.5		v			v				v
34252132	2.Population Genetics	2	3.0		v			v				
34250682	3.Plant Micro technique	2	3.0						v	v		
34250512	4.Animal Micro technique	2	3.0						v	v		
34250282	5.Ornithology	2	3.0					v				v
34252093	6.Entomology (MBKM)	3	4.5						v			v
34250442	7.AMDAL	2	3.0		v				v			
	8.Urban Biodiversity	2	3.0		v			v				
34250842	9.Biosistematics of Microorganisms	2	3.0					v			v	
34251402	10.Biology of Yeast	2	3.0					v			v	
34251382	11.Bacteriology	2	3.0					v			v	
34251533	12.Food Microbiology	2	3.0					v	v		v	
Semester 6												
34251873	Fundamental of Ecology	3	4.5		v			v				
34251881	Practicum of Fundamental of Ecology	1	1.5		v			v				
34251932	Plant Tissue Culture	2	3.0					v	v			
34251941	Practicum of Plant Tissue culture	1	1.5			v		v				
34251092	Biotechnology	2	3.0		v			v				
34250212	Evolution	2	3.0		v			v				
34251952	Techniques on Scientific Writing	2	3.0		v	v					v	
	Elective courses (3-4 courses)	8	12									
	Total CP	**22**	**33**									
Elective courses												
	1.Plant Virology	2	3.0		v			v				v
	2.Genetics Conservation (MBKM)	2	3.0		v			v				
34252122	3.Secondary Metabolites in Plant	2	3.0		v			v				
34252073	4.Plant nutrition	2	3.0		v	v		v				
34251102	5.Biogeography	2	3.0		v			v				
34250262	6. Animal Research Husbandry	2	3.0		v				v			
34251422	7. Animal Bio reproduction	2	3.0		v					v		
34251992	8. Animal Endoparasite	2	3.0		v			v				
34252042	9. Animal Endocrinology (MBKM)	2	3.0		v			v				
34250772	10.Limnology	2	3.0		v			v				
34252063	11.Physiology of Marine Life (MBKM)	3	4.5					v	v			
34251393	12.Fungi Biodiversity	3	4.5					v				
34250642	13.Environmental Microbiology	2	3.0					v	v			
	14.Enzimology	2	3.0		v			v				
Semester 7												
34251202	Field work (KKL)	2	3.0		v	v		v	v			v
34250782	Internship program	3	4.5	v	v	v						
30052072	Seminar on research proposal	2	3.0		v	v				v		v
	Elective courses (3-4 courses)	8	12									
	Total CP	**15**	**22.5**									
Elective courses												

34252023	1.Plant Ecophysiology (MBKM)	3	4.5		v	v		v				
34251553	*2.Plant Reproduction and Breeding*	3	4.5			v		v				
34250852	3.Plant Biotechnology	2	3.0			v		v				
34250722	4.Plant Ecology	2	3.0		v			v				
	5.Phytoremediation	2	3.0		v				v			
34251192	6.Teratology	2	3.0		v			v				
34251432	7.Animal Biotechnology	2	3.0			v		v				
34251982	8.Animal Ectoparasite	2	3.0		v			v				
34251172	9.Immunology	2	3.0		v							
34250002	10.Marine Ecology	2	3.0		v			v				
	11.Biology Conservation (MBKM)	3	4.5						v			v
34252103	12.Fundamentals of Bioinformatics	2	3.0		v					v		
	13.English for Biology 2	2	3.0	v		v						
Semester 8												
30052004	Undergraduate thesis	4	6.00		v	v		v	v		v	
	Total CP	4	6.00									
	TOTAL CREDITS	**144-147**	**216-220.5**									