SUMMARY OF CURRICULUM



Ecopreneurship
Growing with character

Undergraduate Programme in Biology
Faculty of Mathematics and Natural Sciences
Universitas Negeri Surabaya
2021

OBJECTIVE OF THE DEGREE PROGRAM

1. The Vision and Mission of Institution

Vision of Universitas Negeri Surabaya is as follows:

Excellent in Education, Strong in Science

Mission of Universitas Negeri Surabaya are as described in the following:

(1) To organize education and learning centered on students by using effective learning approaches and technology

(2) To conduct research in education, natural sciences, social and cultural sciences, arts, and/or sports, and technological development whose findings are beneficial for the development of science and public welfare

(3) To disseminate science, technology, arts, culture and sports, and research results through community service oriented towards empowering and accustoming society

(4) To embody Universitas Negeri Surabaya as a center of education not only for primary and secondary education but also for scientific centers based on the noble values of national culture

(5) To organize autonomous, accountable, and transparent governance for quality assurance and quality improvement.

The Vision and Mission of the Faculty

Vision of Mathematics and Natural Science Faculty (FMNS) are as follows:

Excellent in Educational Mathematics and Natural Science, Strong in Mathematics and Natural Science Studies

Extended Vision of Mathematics and Natural Science Faculty (FMNS) are as follows:

(1) Excellence in mathematics and natural science education innovation.

(2) Strength not only in mathematics and natural sciences studies and its application but also be able to reinforce mathematics and natural science education (wider mandate).

(3) Excellence in global competition.

(4) Excellence graduates who are environmentally minded and have an entrepreneurial spirit.

The term "excellent" referred to the FMNS Vision means to be innovative, competitive, and always trying to improve quality. The term "strong" means to work systematically, methodically, and objectively, in order to support the excellence of the studies in mathematics and natural sciences.

Mission of FMNS are as follows**.**

(1) To organize innovative and research-based mathematics and natural sciences education in order to produce graduates who have environmental insight, an entrepreneurial spirit and global competitiveness.
(2) To conduct mathematics and natural sciences research in strengthening science that is recognized nationally and internationally as well as strengthening mathematics and natural science education.
(3) To organize research-based community service for supporting the community welfare.
(4) To build a strong network with stakeholders for improving the quality and image of FMNS.
(5) To organize autonomous, credible, fair, accountable, and transparent governance for quality assurance and quality improvement in FMNS.

Based on vision and mission, the **objectives of FMNS UNESA** are:

a) To produce graduates of MNS and MNS education who have environmental insight, entrepreneurial spirit, and global competitiveness.
b) To produce MNS research and MNS education products to strengthen MNS and MNS education.
c) The implementation of research-based community service program to support community welfare.
d) To build a strong collaboration with stakeholders for improving the quality and image of FMNS.

e) To build a system in FMNS that is autonomous, credible, fair, accountable, and transparent for quality assurance and quality improvement.

2. **Program Educational Objectives (PEO)**

As biologist is one of the pillars of in the development of modern technology, the quality of how biology is studied and developed need to be improved in accordance with the effort to increase the skills associated with deeper learning, which is based on mastering skills such as analytic reasoning, complex problem solving, and teamwork, as described in 21st Century skills. These skills are trusted to be the factors of being success in 21st century, which covers skills, abilities, and learning dispositions that have been identified as requirements for success in 21st century society and workplaces by educators, business leaders, academics, and government agencies. This is part of a growing international movement that focuses on the skills needed for students to be mastered in preparation for success in a fast-changing digital society.

Achievements expected by study programs of graduates are professional, academic, and social accomplishment. Professional accomplishment is an ability possessed by students according to the area of expertise that characterizes the study program or graduate profile. Undergraduate Programme of Biology to produce graduates as **Professionals in Academic**, **Researcher Assistant**, **Practitioner**, and **Entrepreneur.** The determination of the graduate profile is based on the evaluation results of the tracer study.

Tracer study for graduates of Undergraduate Programme of Biology showed that in the last 5 years, graduates work as academician (52%), practitioners (32%), entrepreneurs (11%), and researcher assistants (6%). Tracer study is in line with the profile of Undergraduate Programme of Biology. Graduates working as academicians have occupations as instructors both in universities and schools, laboratory staff both in universities and schools, tutors in tutoring agencies, while graduates working as practitioners have occupation as quality control analyst, company staffs, and office and banking staffs.

Academic accomplishment is the ability to always develop through further study. The PEO in the Undergraduate Programme of Biology also includes the academic component of accomplishment, which is the ability to lifelong learning and the ability to

communicate in professional activities. In the PEO Undergraduate Programme of Biology also includes components of Social accomplishment, namely social skills and leadership. The PEO of The Undergraduate Programe of Biology is the following.

1. Mastery of basic concepts of biology, natural resources, and environment and ability to apply them to solve various biological issues in professional work;
2. Ability to manage natural resources and environment, and develop biological products according to to strengthen bioecopreneurship;
3. Mastery over scientific method to analyze biological issues and its application, work systematically and methodically;
4. Have ethics, responsibility, leadership, and environmental insight;
5. Ability to develop self in biological intelligence and skills both formally and informally, and communicate in professional activity.

These objectives strongly support the national competences framework for undergraduate education and are consistent with the mission of FMNS and Unesa. Such a consistency is realized by producing graduates with a strong ability to comprehend and to master biology knowledge and their application in real-life problem. Formulated PEOs are also in sync with 6th level National Qualification Framework (KKNI), which is the framework for general bachelor level in Indonesia, as indicated in table 1.

Table 1. Correlation of Program Educational Objectives to 6th level (bachelor) of the National Qualification Framework (KKNI)

PEO No.	6th Level KKNI competence*			
	Capable of apply science, technology, and art within his/her expertise and adaptable to various situations faced during solving a problem	Mastering in-depth general and specific theoretical concepts of certain knowledge and capable of formulating problem-solving procedure	Capable of taking strategic decision based on information and data analysis as well as providing direction in choosing several alternative solutions	Responsible for his/her own jobs and can be assigned to take responsibility of the attainment of organization's performances
PEO 1	S	S	NS	NS
PEO 2	S	S	NS	S
PEO 3	S	S	S	S
PEO 4	NS	NS	S	S
PEO 5	S	S	S	S

*) S: Strongly related, NS: Not strongly related

3. Program Learning Outcomes (PLOs)

Undergraduate Program in Biology in FMNS, Unesa sets the program learning outcomes (PLO) for the graduates as presented in Table 2. This PLO consists of 4 aspects, namely aspects of knowledge, aspects of skills, aspects of competence, and aspects of attitude. These four aspects are aspects that are in accordance with the demands of the KKNI which are used as a basis for curriculum development in the Undergraduate Programme of Biology and refer to KOBI as an association of Undergraduate Programme of Biology in Indonesia. For the aspect of knowledge refers to the formulation of KOBI, while the aspects of specific competencies are formulated by the Undergraduate Programme of Biology in accordance with the specifics of the study program and graduate profile, while general competencies and attitudes are formulated based on KKNI.

The development of mastery of knowledge, contains understanding, namely: (1) mastery of knowledge about biological principles (for example: the concept of species, population, genes), (2) mastery of knowledge about the application concept in the field of biology (for example: the concept of applying analytical methods vegetation for the conservation of biological resources), (3) mastery of the latest biological knowledge to support as a young researcher, research development / quality control, and entrepreneurs in the field of biology, (4) mastery of knowledge about the basic principles of the application of devices for analysis and synthesis in the field of Biology (for example: the basic principle of application of a microscope).

Table 2. PLO of The Undergraduate Programme of Biology

PLO	CODE*
Demonstrate basic knowledge of biology relevant to science and mathematics to understand current scientific phenomena and issues and apply them in problem solving.	**KN-1**
Demonstrate basic knowledge of cell and molecular biology, organismal biology, ecology and evolution to analyze current biological issues.	**KN-2**
Apply biological knowledge and technology for solving natural resource and environmental problems both in the laboratory and in real practice that supports the profession and or entrepreneurship.	**KN-3**
Demonstrate the basic principles of software applications and instruments, standard analytical methods, and synthesis in biology	**KN-4**

PLO	CODE*
Work independently in laboratory to develop relevant skills by applying bioethics and occupational safety	**SC-1**
Design and conduct experiments in the field of biology, manage, analyze, interpret, document and store data research, to manage living natural resources	**SC-2**
Apply transferable skills in biology to develop ecopreneurship (eco-innovation, eco-opportunity, eco-commitment).	**SC-3**
Communicate scientific ideas, both orally and in writing using appropriate communication media as targeted, as a provision for lifelong learning for academic self-development.	**GC-1**
Apply logical, critical, systematic, and innovative thinking in the context of developing or implementing science and / or technology in accordance with their field of expertise	**GC-2**
Work independently both as individuals and in groups, and responsibly in completing tasks in classes, laboratories, and in the field.	**ATS-1**
Able to demonstrate the religious and cultural values of the nation, as well as academic ethics in carrying out their professional duties	**ATS-2**

*) KN : Knowledge, SC : Specific competences, GC: General competences, AT : Attitude and Social competence

Correlation of PLOs to each PEOs and PLOs to ASIIN competences are presented in Table 3 and Table 4 respectively.

Table 3. Correlation between the PEOs and PLOs of Undergraduate Program of Biology in FMNS, UNESA

PLO Code	PEOs Number*				
	1	2	3	4	5
KN-1	V	X	X	X	V
KN-2	V	X	X	X	V
KN-3	V	X	V	X	X
KN-4	X	X	V	X	X
SC-1	X	X	X	V	V
SC-2	V	X	V	V	X
SC-3	X	V	X	V	X
GC-1	X	X	X	X	V
GC-2	V	V	X	X	V
AT-1	X	X	X	V	X
AT-2	V	X	X	V	V

*) V = correlated ; X = not correlated

Table 4. Correlation of ASIIN SSCs and GSCs to PLOs

SPECIALIST COMPETENCES	PLO Code										
	KN-1	KN-2	KN-3	KN-4	SC-1	SC-2	SC-3	GC-1	GC-2	AT-1	AT-2
have acquired sound fundamental biology relevant knowledge of mathematics and the natural sciences	Relevant										
have sound knowledge of the fundamentals of molecular, cell and organismic biology		Relevant									
have gained methodological competence in bio sciences and are also able to apply this in other contexts				Relevant							
are able to carry out practical work in labs and outdoors independently as well as handle organisms			Relevant		Relevant						
have relevant knowledge of safety and environmental issues as well as the associated legal fundamentals			Relevant								
have gained sound knowledge in at least one special life science area of the degree programme						Relevant					

SPECIALIST COMPETENCES	PLO Code										
	KN-1	KN-2	KN-3	KN-4	SC-1	SC-2	SC-3	GC-1	GC-2	AT-1	AT-2
are able to recognise and solve subject relevant problems			Relevant			Relevant					
are able to solve life science problems and present the results.							Relevant				
SOCIAL COMPETENCES											
have trained conceptual, analytical and logical thinking									Relevant		
have an awareness of possible social, ethical and environment-related effects of their actions										Relevant	
have acquired communication skills, also in a foreign language and can communicate scientific information to experts and laypersons in a suitable manner								Relevant			Relevant
have a capacity for teamwork, also on an intercultural basis										Relevant	
have acquired lifelong learning strategies.								Relevant			

PROGRAM STRUCTURE

1. The Curriculum

The Undergraduate program in Biology of FMNS Universitas Negeri Surabaya has a degree of Bachelor of Science (Sarjana Sains or S.Si), in which students can explore some specific areas or fields in biology.

In the field of biological studies, this branch of natural science studies the organisms' system of living things which includes the study of the structure, processes, diversity and continuity of these systems. The study of biology is explored in: (1) Cell and Molecular Biology that studies the organization of living things at the cellular and sub-cellular level, (2) Physiology studies the processes that occur in living things systems, (3) Genetics that studies the substance of genes and its inheritance processes to ensure the survival of living body systems, (4) Structure and Development that studies individual-level organizations and ontogenic changes in the organization, (5) Biosystematics and Evolution that studies the diversity of living things and their phylogenic history, and (6) Ecology study the organization of individual interactions from the level of population, community, ecosystem to the biosphere.

The curriculum is developed to achieve the vision, the mission, and the goals set. It must accommodate the whole educational objectives by taking into account the characteristics of Unesa as a local learning setting that is realized in the learning outcomes of study programs. In addition, the curriculum of Undergraduate Programme of Biology must be able to provide a learning experience for students to achieve the expected competencies and self-development, both now and in the future. Therefore, the curriculum of The Undergraduate Program of Biology is expected to be able to answer the demands of the needs in the field. Some issues considered in the preparation and development of this curriculum are as follows.

1. Indonesian National Qualification Framework (KKNI: Kerangka Kualifikasi Nasional Indonesia);
2. National Standards for Higher Education;
3. 21st century skills needed, namely critical thinking and problem solving, creative and innovative, communication, and collaboration;

4. Indonesia Biology Consortium (KOBI) regulation dan framework;
5. The ASEAN Economic Community since 2015;
6. The importance of literacy, according to the Law of Ministry of Education (Permendikbud No. 23 of 2015) concerning the improvements of manners;
7. The development of global community dynamics that need to be anticipated for its development to prepare reliable Indonesian human resources, such as the challenges of the ASEAN Free Trade Area (AFTA), the Word Trade Organization (WTO), and the Asia Pacific Economic Cooperation (APEC).

Furthermore, the current curriculum adopts new paradigm of education, which are out-comes based education, learner-centered learning, continuous improvement, and international benchmarking and accreditation. The curriculum is periodically updated every five years by following the development processes of the curriculum considering some principles of the curriculum development. This is shown in the following chart.

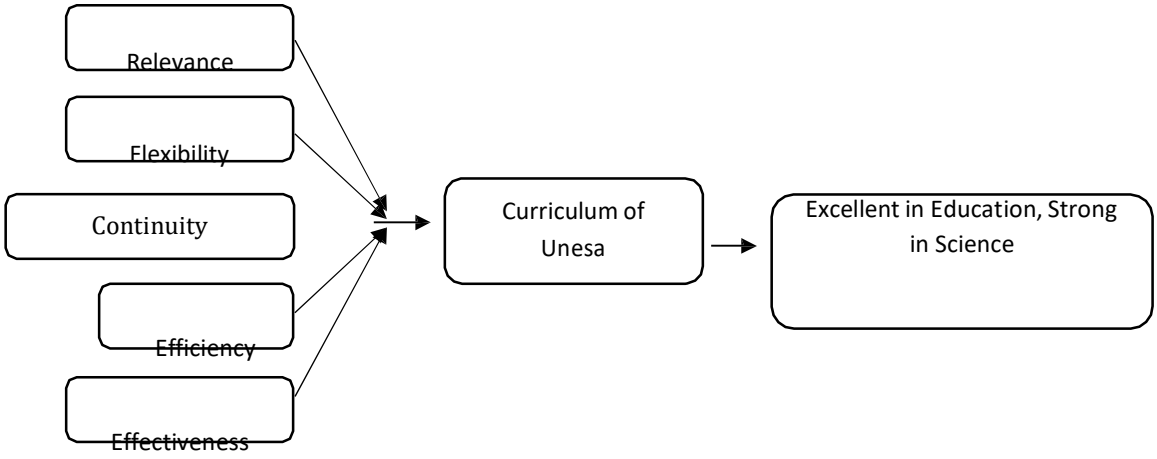

Figure 1. Principles of curriculum development

The Undergraduate Program in Biology (Bachelor of Science) is managed by Faculty of Mathematics and Natural Sciences, Universitas Negeri Surabaya (FMNS-Unesa). The Undergraduate Program in Biology conducted learning to produce graduates with mastery both conventional and modern biological concepts, skills to solve daily issues, and entrepreneurship passion who are able to compete globally to strive for well-

being. To produce the expected graduates, development of suitable curriculum in accord to up-to-date science and technology. Curriculum as direction and purpose of development have dynamic in order to reach the expected aim. This dynamic is a consequence of society development that should be accommodated.

Higher education curriculum is developed by referring to National Standard of Higher Education for respective Study Program which encompass intellectual intelligence, morality, and skills. Universitas Negeri Surabaya regulates curriculum development in **Academic Policy** of Universitas Negeri Surabaya as established in Rector Decree No. 466/UN38/HK/DT/2016, which then revised to be Academic Policy of UNESA with Rector Decree No. 340/UN38/HK/KP/2016 to conform with newest law and regulation on higher education; Permenristekdikti No. 44 year 2015 on National Standard of Higher Education.

The purpose of education in Unesa and Faculty of Mathematics and Natural Sciences become the fundamentals in defining education purpose of respective study programs and courses. Learning outcomes and graduate profile of Undergraduate Programme of Biology are further described in vision, mission, and aim as reflected in Program Educational Outcomes (PEOs) and Program Learning Outcomes (PLOs).

To complete the learning program, students should take 144 credit units (CU) comprising 122 CU as a compulsory courses and 22 CU as an elective course.

Table 5. Compulsory and elective courses in Biology, UNESA

CU compulsary courses	CU	Note
CU of compulsory courses	122 / 193,98 ECTS	The CU courses are distributed into 43 compulsory courses.
CU of elective courses	22 / 34,32 ECTS	There are 100 available credit unit which is distributed into 50 elective courses and students should take at least 22 course unit.
Total	144	

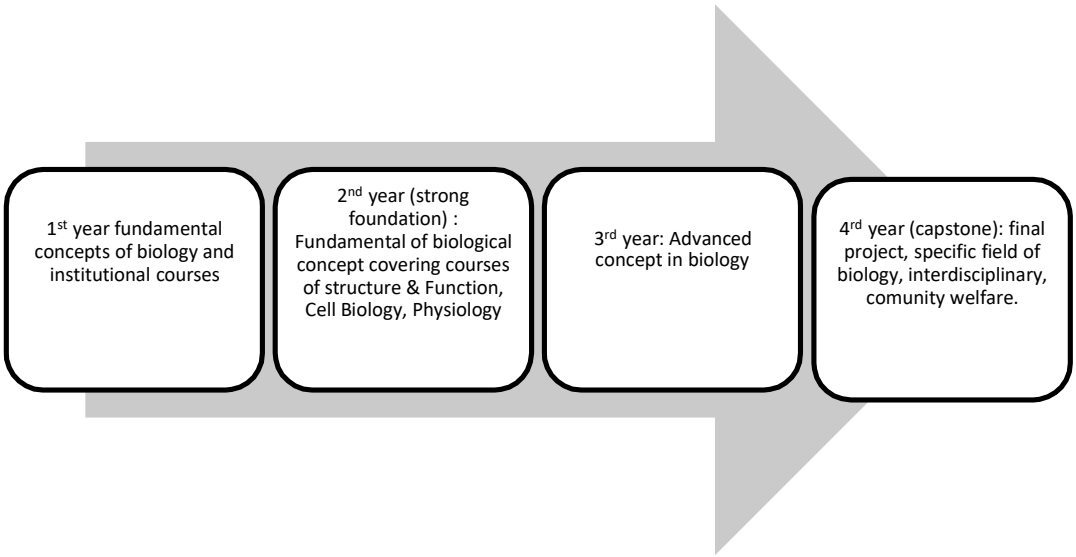

Figure 2. Model of Curriculum Structure of The Undergraduate Programme of Biology

Curriculum implementation can be seen from graduate response during tracer study, which showed that 69% of all graduates works in biology-related field, indicating that curriculum in Undergraduate Programme of Biology is relevant and adaptable to be applied.

2. Program Structure

Curriculum accommodates courses that support attainment of graduate competences and enable freedom to students to broaden knowledge and deepen proficiency based on their interest. Curriculum is equipped with course description (Academic Guidebook), Learning Plan, and learning evaluation.

Before courses in curriculum of Undergraduate Programme of Biology are formulated, topics are predetermined from competences/Learning Outcomes. Determination of topics are aimed to fulfill and cover all element in Learning Outcomes with degrees of freedom over knowledge and mastery. Development of topics result in course concepts, formulation, and weight of course credits. Courses in every term are organized systematically and analysis of relationship among courses is required. Based on the topic that has been compiled and determined the mapping in each semester, further developed courses and determined the amount of credit. Development of courses based on topics is listed in Table 6.

Table 6. Relationship of PLO and Courses

No	Course Code	Courses	Credit Units	Term	Knowledge				Specific Competences			General Competences		ATTITUTE	
					PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
1	4620103073	General physics	3	1											
2	1000002018	Pancasila education	2	1											
3	4620103018	English	2	1											
4	4620103033	General Biology	3	1											
5	4620103119	Basic mathematics	3	1											
6	1000002003	Bahasa Indonesia	2	1											
7	4620102195	Physical education and sports	2	1											
8	4620103103	General chemistry	3	1											
9	1000002026	Islamic education	2	2											
10	1000002024	Buddhist education	2	2											
11	1000002025	Hindus education	2	2											
12	1000002027	Catholic education	2	2											
13	1000002028	Khonghucu education	2	2											
14	1000002029	Protestant education	2	2											
15	1000002033	Civil Education	2	2											
16	4620104010	Animal Anatomy	4	2											
17	4620103026	Biochemistry	3	2											
18	4620102187	Digital literation	2	2											
19	4620102021	English for Biology	2	2											
20	4620102106	Conservation of natural resources and environment	2	2											
21	4620104173	Plant Structure and Development	4	2											
22	4620103036	Biostatistics and Biocomputer	3	3											
23	4620104076	Plant Physiology	4	3											
24	4620103127	Microbiology	3	3											

No	Course Code	Courses	Credit Units	Term	Knowledge				Specific Competences			General Competences		ATTITUTE	
					PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
25	4620104161	Animal Systematics	4	3											
26	4620104163	Plant Systematics	4	3											
27	1000002011	Basic social and culture	2	3											
28	4620102192	Entrepreneurship	2	3											
29	4620102030	Cell Biology	2	4											
30	4620104044	Ecology	4	4											
31	4620104074	Animal physiology	4	4											
32	4620104081	Genetics	4	4											
33	4620103108	Tissue Culture	3	4											
34	4620102068	Philosophy of science	2	4											
35	4620103117	Quality Control Management	3	4											
36	4620102028	Molecular Biology	2	5											
37	4620103041	Ecophysiology	3	5											
38	4620102064	Evolution	2	5											
39	4620102099	Advanced entrepreneurships	2	5											
40	4620103124	Methodology of biological research	2	5											
41	4620102134	Microtechnique	2	5											
42	4620102037	Biotechnology	2	5											
43	4620102003	Algology	2	5											
44	4620102022	Bacteriology	2	5											
45	4620103049	Ocean Ecology	3	5											
46	4620102054	Ecotoxicology	2	5											
47	4620102059	Plant Embryology	2	5											
48	4620102060	Endocrinology	2	5											
49	4620102066	Pharmacognosy	2	5											
50	4620102077	Phytogeography	2	5											
51	4620102078	Phytohormone	2	5											
52	4620102083	Population genetics	2	5											

No	Course Code	Courses	Credit Units	Term	Knowledge				Specific Competences			General Competences		ATTITUTE	
					PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
53	4620102092	Nutrient science	2	5											
54	4620102094	Immunology	2	5											
55	4620102112	Limnology	2	5											
56	4620102153	Planktonology	2	5											
57	4620102156	Protozoology	2	5											
58	4620102158	Animal reproduction	2	5											
59	4620102162	Microbial systematics	2	5											
60	4620102191	Zoogeography	2	5											
61	4620102007	Analysis of environmental impact	2	6											
62	4620102148	Environment tal science	2	5											
63	4620102159	Seminary	2	6											
64	4620102023	Bio exploration	2	6											
65	4620102032	Applied Biology	2	6											
66	4620102186	Analysis technique of molecular biology	2	6											
67	4620103154	Practice of field work	3	6											
68	4620102038	Cultivation of water biota	2	6											
69	4620102061	Entomology	2	6											
70	4620102062	Ethnobotany	2	6											
71	4620102125	Mycology	2	6											
72	4620102136	Plant Morphogenesis	2	6											
73	4620102144	Waste Management	2	6											
74	4620102029	Food biology	2	6											
75	4620102050	Social Ecology	2	6											
76	4620102051	Soil ecology	2	6											
77	4620102063	Ethology	2	6											
78	4620102075	Comparative physiology	2	6											
79	4620102084	Applied genetics	2	6											
80	4620102085	Plant pests and diseases	2	6											

No	Course Code	Courses	Credit Units	Term	Knowledge				Specific Competences			General Competences		ATTITUTE	
					PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
81	4620102088	Histology	2	6											
82	4620102114	Malacology	2	6											
83	4620102115	Memology	2	6											
84	4620102131	Health Microbiology	2	6											
85	4620102132	Environmental Microbiology	2	6											
86	4620102009	Human anatomy and physiology	2	6											
87	4620102138	Oncology	2	6											
88	4620102139	Ornithology	2	6											
89	4620102146	Management of natural resources	2	6											
90	4620102179	Numerical taxonomy	2	6											
91	4620102190	Virology	2	6											
92	4620103194	Community service	3	7											
93	4620106164	Thesis	6	7											
94	4620102082	Microbial genetics	2	7											
95	4620102090	Horticulture and food plants	2	7											
96	4620102116	Management of natural resources	2	7											
97	4620102130	Industrial microbiology	2	7											
98	4620102140	Parasitology	2	7											
99	4620102079	Phytopathology	2	7											

List of Courses available in Undergraduate Programme in Biology (UPB) FMNS UNESA

A. Compulsory Courses

Term I				Term II			
No	Course code	Course name	Credit unit	No	Course code	Course name	Credit unit
1	1000002033	Study of Pancasila	2	1	1000002026	Religion	2
3	4620103033	Basic Biology*	3	2	1000002033	Civic Education	2
4	4620103103	General Chemistry*	3	3	4620102021	English for Biology	2
5	4620103073	General Physics*	3	4	4620104173	Plant Structure development*	4
6	4620103119	Basic Mathematics	3	5	4620102187	Laboratory technique*	2
7	4620103018	Bahasa Indonesia	2	6	4620103026	Biochemistry*	3
8	4620103018	English	3	7	4620104010	Animal Anatomy*	4
				8	4620102106	Conservation of natural resources and environment	2
9	4620103119	Physical education and sports	2				
Total credit			21 (33.39 ECTS)	Total credit			21 sks (33.39 ECTS)

*) integrated with practicum

Term III				**Term IV**			
No	**Course code**	**Course name**	**Credit unit**	**No**	**Course code**	**Course name**	**Credit unit**
1	4620104076	Plant physiology*	4	1	4620102030	Cell Biology	2
2	4620103127	Microbiology*	3	2	4620104044	Ecology*	4
3	4620104161	Animal systematics*	4	3	4620104074	Animal physiology*	4
4	4620104163	Plant systematics*	4	4	4620104081	Genetics*	4
5	1000002011	Basic social and culture	2	5	4620103036	Biostatistics and Biocomputer	3
6	4620102192	Entrepreneurship	2	6	4620102068	Philosophy of Natural sciences	2
Total credit			19 (30.21 ECTS)	Total credit			19 (30.21 ECTS)

*) integrated with practicum

Term V				Term VI			
No	**Course code**	Course name	Credit unit	No	Course code	Course name	Credit unit
1	4620102028	Molecular Biology	2	1	4620102023	Bio exploration	2
2	4620102037	Ecophysiology	3	2	4620102032	Applied biology	2
3	4620102064	Evolution	2	3	4620102186	Analysis technique of molecular biology	2
4	4620103124	Methodology of biological research	3	4	4620103154	Internship	3
5	4620102134	Microtechnique	2	5	4620103108	Tissue Culture	3
6	4620102099	Advanced Ecopreneurs hip	2	6		Electives 2	2
7	4620103117	Management Quality Control	3	7		Electives 3	2
				8		Electives 4	2
		Electives 1	2			Electives 5	2
Total credit			19 (30.21 ECTS)	Total credit			20 (31.8 ECTS)

*) integrated with practicum

Term VII				Term VIII			
No	Course code	Course name	Credit unit	No	Course code	Course name	Credit unit
1	4620106164	Seminar	2	1	8420506222	Thesis	6
2	4620103194	Community service	3	2		Elective 11	2
3		Electives 6	2			Electives 12	2
4		Electives 7	2				
5		Electives 8	2				
6		Electives 9	2				
7		Electives 10	2				
Total credit			15 (23.85 ECTS)	Total credit			10 (15,9 ECTS)

B. Elective Courses

times				Even term (2nd term of academic year)			
No	**Course code**	**Course name**	**Credit unit**	**No**	**Course code**	**Course name**	**Credit unit**
1	4620102003	Algology *)	2	25	4620102083	Population genetics *)	2
2	4620102022	Bacteriology *)	2	26	4620102090	Horticulture	2
3	4620102038	Cultivation of water biota *)	2	27	4620102092	Nutrient science *)	2
4	4620103049	Ocean Ecology *)	2	28	4620102094	Immunology *)	2
5	4620102054	Ecotoxicology *)	2	29	4620102112	Limnology *)	2
6	4620102059	Plant Embryology *)	2	30	4620102116	Management of Aquatic ecosystems *)	2
7	4620102060	Endocrinology*)	2	31	4620102125	Mycology *)	2
8	4620102061	Entomology *)	2	32	4620102130	Industrial microbiology*)	2
9	4620102062	Ethnobotany *)	2	33	4620102136	Plant morphogenesis *)	2
10	4620102066	Pharmacognosy * *)	2	34	4620102140	Parasitology *)	2
11	4620102077	Phytogeography *)	2	35	4620102144	Waste management*)	2
12	4620102078	Phytohormone *)	2	36	4620102153	Planktonology *)	2
13	4620102156	Protozoology *)	2	37	4620102162	Microbial systematics* *)	2
14	4620102158	Animal reproduction* *)	2	38	4620102191	Zoogeography* *)	2
15	4620102007	Analysis of environmental impact *)	2	39	4620102051	Soil ecology * *)	2
16	4620102009	Human anatomy and physiology *)	2	40	4620102063	Ethology* *)	2
17	4620102029	Food biology *)	2	41	4620102075	Comparative physiology* *)	2
18	4620102050	Social ecology *)	2	42	4620102084	Applied genetics* *)	2
19	4620102085	Plant pests and diseases * *)	2	43	4620102131	Health Microbiology * *)	2
20	4620102088	Histology* *)	2	44	4620102132	Environmental Microbiology * *)	2
21	4620102114	Malacology* *)	2	45	4620102138	Oncology* *)	2
22	4620102115	Mammalogy* *)	2	46	4620102139	Ornithology* *)	2
23	4620102146	Management of natural resources * *)	2	47	4620102148	Environmental science * *)	2
24	4620102179	Numerical taxonomy* *)	2	48	4620102190	Virology* *)	2
Total credit of electives available				48 (76.32 ECTS)			