



GEDUNG
BIOLOGI

Curriculum

**Bachelor in Biology Study Program
Faculty of Mathematics and Natural Sciences
University of Jember
2022**

✉ : biologi.fmipa@unej.ac.id

🌐 : <https://biologi.fmipa.unej.ac.id>

☎ : +62 331 338 696



CURRICULUM

BACHELOR IN BIOLOGY STUDY PROGRAM

Head of Study Program	: Dr. Dra. Retno Wimbaningrum, M.Si
ID	: 196605171993022001
Study Program	: Biology
Faculty	: Mathematics and Natural Sciences

UNIVERSITY OF JEMBER, 2022



	UNIVERSITY OF JEMBER	Code/ Study Program	F1.02.03/ Bachelor in Biology
		Valid since	
	CURRICULUM DOCUMENT	Revision	1
		Page	

Process	Person in Charge			Date
	Name	Position	Signature	
Coordinator	Dr. Retno Wimbaningrum M.Si.	Task force team leader		19 November 2021
Reviewer	Eva Tyas Utami, S.Si., M.Si.	Quality Assurance Unit		19 November 2021
Approval	Drs. Achmad Saifullah, M.Sc. Ph.D.	Dean		19 November 2021
Validator	Dr. Ir. Iwan Taruna, M.Eng., IPM.	Rector		
Monitor	Drs. Albert Tallapessy, MA., Ph.D.	Head of LP3M		



CONTENTS

PREFACE	IV
STUDY PROGRAM IDENTITY	V
1. CURRICULUM FOUNDATION	1
1.1 UNIVERSITAS VALUE	1
1.2 PHILOSOPHICAL FOUNDATION	1
1.3 HISTORICAL PLATFORM	2
1.4 LAW AND REGULATION	3
2. VISION, MISSION, AND OBJECTIVE	4
2.1 VISION AND MISSION OF UNIVERSITY OF JEMBER	4
2.2 VISION, MISSION AND OBJECTIVES OF THE FACULTY OF MATHEMATICS AND NATURAL SCIENCES	4
2.2 VISION, MISSION AND EDUCATIONAL GOALS OF THE BACHELOR IN BIOLOGY STUDY PROGRAM	5
3. CURRICULUM AND TRACER STUDY EVALUATION	7
3.1 CURRICULUM AND TRACER STUDY EVALUATION	7
3.2 TRACER STUDY	11
4. GRADUATE PROFILES AND PROGRAM LEARNING OUTCOMES (PLO)	13
4.1 GRADUATE PROFILE	13
4.2 THE FORMULATION OF PROGRAM LEARNING OUTCOMES (PLO)	13
5 THE DETERMINATION OF STUDY PROGRAM	20
5.1 BODY OF KNOWLEDGE (BoK)	20
5.2 THE DESCRIPTION OF STUDY MATERIALS	21
6. FORMATION OF COURSES AND COURSE CREDITS	23
7. COURSE ORGANIZATION AT THE BACHELOR IN BIOLOGY STUDY PROGRAM	29
8. COURSE DISTRIBUTION	30
9. THE IMPLEMENTATION OF MBKM PROGRAMS	37
A. FORMS, ORGANIZERS, AND REQUIREMENTS OF LEARNING ACTIVITIES	37
B. STUDENT EXCHANGE	38
C. INTERNSHIP/WORK PRACTICE	39
D. TEACHING ASSISTANCE IN EDUCATION UNITS	44
E. RESEARCH	46
F. HUMANITARIAN PROJECT	50
G. ENTREPRENEURSHIP	51
I. VILLAGE DEVELOPMENT/THEMATIC STUDENT STUDY SERVICE (KKN)	54
J. PRINCIPLES IN CONVERTING AND CALCULATING GRADES AND CREDITS IN MBKM PROGRAMS	55
10. THE MANAGEMENT AND MECHANISM OF CURRICULUM IMPLEMENTATION	57



PREFACE

Thank God Almighty for the ability given to the Bachelor in Biology Study Program, Faculty of Mathematics and Natural Sciences, Jember University to be able to complete this Curriculum Guide. This curriculum is a revision of the Indonesian National Quality Framework (INQF)-Based Curriculum which has been applied since 2017 to become the INQF-Based Curriculum the OBE Approach Supports the Independent Learning–Independent Campus (ILIC). This curriculum reconstruction is a response to the issuance of Ministry of Education and Culture decree No. 3 of 2020 concerning National Standards for Higher Education and Regulation of the Chancellor of the University of Jember No 13532/UN25/EP/2020 concerning Freedom to Study at the University of Jember.

In reconstructing the curriculum, several revisions were carried out including compressing the CPL from twelve to seven, increasing the quality of case method and problem based learning methods applications, formating the new module handout, incorporating the ILIC into the curriculum, supporting materials such as lesson plans, syllabus, lecture contracts, student worksheets, student work plans, portfolios and rubrics assessment. The application of this curriculum must be equipped with achievement evaluation of each study Program Learning Outcome (PLO) every semester. The PLO achievement is an outcome of the learning process that describes what students/graduates have achieved from the learning process.

This curriculum reconstruction is expected to improve the quality of learning and the graduates employ the coherence Learning Objectives at their future works. In addition, the learning process carried out can support the achievement of the University of Jember's Performance Indicators.

Jember, November 2021



STUDY PROGRAM IDENTITY

1.	Institution	:	University of Jember
2.	Implementation the Learning Process		
	Faculty	:	Mathematic and Natural Sciences
	Study Program	:	Bachelor in Biology
	Establishment decree number	:	98/DIKTI/Kep/2001
	Establishment decree date of issue	:	April 16 th 2001
	Office Address	:	JL. Kalimantan 37 Jember 68121
	Telephone No./Fax.No.	:	0331 – 338696 / 0331 – 330225
	Homepage	:	http://biologi.fmipa.unej.ac.id
	E-mail	:	biologi.fmipa@unej.ac.id
	Study program code	:	1810401
3.	Study program accreditation status	:	B-Decree of BAN PT No: 13711/SK/BAN-PT/Ak.-PPJ/ S/XII/ 2021 date of December 28 th 2021, effective date since December 27 th 2021 to December 27 th 2026
4.	Education level	:	Bachelor
5.	Graduate Qualifications based on Indonesian National Qualification Framework	:	6 th Level
6.	Graduate Degree	:	Bachelor of Science (S.Si.)
7.	Student Number	:	332
8.	Lecturer Number	:	24
9.	Lecturer:Student ratio	:	1:14 (1 lecturer for 14 students)



1. Curriculum Foundation

1.1 Universitas Value

The University of Jember has a strategic role in educating the nation's life and advancing science and technology by paying attention and applying the values of the humanities as well as the sustainable culture and empowerment of the Indonesian nation. Continued self-development is carried out in line with the development of science and technology in order to achieve the vision of “becoming a superior university in the development of environmental science, technology, arts, business, and industrial agriculture”. The University of Jember plays an important role in preparing and producing graduates as a generation of scholars, competitive and comparative internationally, capable of producing works of science, technology, and art that are prime and of economic value, environmentally friendly, local wisdom and contributive to the people globally. A generation that has an excellent work culture that is able to implement an accountable, effective and efficient quality management system based on information and communication technology. The University of Jember makes an important contribution to developing capabilities and improving the quality of life and human dignity of Indonesia in an effort to realize national goals through the implementation of education, research, and community service.

1.2 Philosophical Foundation

Tropical biodiversity which are the objects of study in the Bachelor in Biology Study Program are expected to increase students understanding of living things in the tropics. Students who study the concepts of structure, process, diversity of living things and the continuity of systems which are further deepened at the molecular and cell levels, physiology, genetics, structure and development, biosystematics and evolution as well as ecology are able to internalize the important value of the existence of other living things for human life. Humans are creatures that have a high dependence on other living things. However, human activities tend to overexploit other living creatures because of their anthropocentric nature. By mastering the correct knowledge about biology and the environment of living things, students are able to internalize a biocentric view that puts forward good ethics when interacting with other living things, solves problems of living things and their environment wisely and wisely, and prioritizes an ecocentric view in managing living things and their environment so as to ensure its sustainability throughout the ages which in the end can guarantee the welfare of humans, present and future generations.



1.3 Historical Platform

In carrying out the learning process, the Bachelor in Biology Study Program which was officially established in 2001 as a study program under the management of the Biology Department, applies a curriculum that is periodically evaluated to align with the development of science and technology and the needs of stakeholders. The curriculum that the study program has applied includes the National Curriculum (1997-2005), the Core and Institutional Curriculum which is also known as the Competency-Based Curriculum (2005-2017), the Higher Education Curriculum which is also known as the Indonesian National Qualification Framework (INQF)-Based Curriculum (2017-2020), and INQF-Based Curriculum OBE approach supports Independent Learning-Independent Campus (ILIC) (2020-present).

One of the reasons for changing the curriculum is the issuance of government regulations that require universities to implement a certain type of curriculum. In making changes to the curriculum, the study program involves all lecturers of the Department of Biology, alumni, active students, and stakeholders. In addition, since 2016 the Bachelor in Biology Study Program has become a member of the association in the field of biology, the Indonesian Biology Consortium (IBC). In preparing the INQF-Based Curriculum, the study program follows the IBC agreement. In addition, it also involves stakeholders and alumni. The IBC agreement and inputs from stakeholders and alumni were then discussed at the study program level. The results of the meeting are used to add the curriculum's local content, to align with tropical natural resources surrounding environments (the position of the study program in the East Java region which is surrounded by four national parks and unique ecosystems) and to utilize the availability of resources owned by the study program.

The last evaluation of study program curriculum was carried out in response to the issuance of Ministry of Education No. 3 of 2020 concerning National Standards for Higher Education and Regulation of the Rector of the University of Jember No 13532/UN25/EP/2020 concerning freedom of learning at the University of Jember. Based on the result there should be some issues related to the program of Independent Learning - Independent Campus (ILIC) added in the curriculum and complete learning tools that do not yet exist such as Student Assignment Plan (SAP), Student Worksheet (SW), Rubric Assessment, and Program Learning Outcome (PLO) achievement every semester. INQF-Based Curriculum OBE approach supports Independent Learning - Independent Campus (ILIC) is applied in the even semester of the 2020-2021 academic year.

1.4 Law and Regulation

Law and Regulation which are used to develop the curriculum of the Biology Undergraduate Study Program, FMIPA, University of Jember are as follows.



1. Constitution of the Republic of Indonesia Number 14 of 2005 concerning Teachers and Lecturers;
2. Constitution of the Republic of Indonesia Number 12 of 2012 concerning Higher Education;
3. Presidential Regulation of the Republic of Indonesia Number 8 of 2012, concerning the Indonesian National Qualifications Framework (INQF);
4. Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 73 of 2013, concerning the Implementation of the INQF in the Higher Education Sector;
5. Regulation of the Minister of Research, Technology and Higher Education of the Republic of Indonesia Number 44 of 2015, concerning National Standards for Higher Education;
6. Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 81 of 2014, concerning Diplomas, Certificates of Competence, and Professional Certificates of Higher Education;
7. Regulation of the Minister of Research, Technology and Higher Education of the Republic of Indonesia Number 32 of 2016, concerning Accreditation of Study Programs and Higher Education;
8. Regulation of the Minister of Research, Technology and Higher Education of the Republic of Indonesia Number 62 of 2016 concerning the Higher Education Quality Assurance System;
9. Rector's Decree No. 10902/UN25/KP/2013 concerning Guidelines for Curriculum Development;
10. Rector's Decree No. 12609/UN25/KR/2018 regarding Guidelines for Curriculum Development
11. Regulation of the Minister of Education of the Republic of Indonesia No. 3 of 2020 concerning National Higher Education Standards
12. Regulation of the Rector of the University of Jember No 13532/UN25/EP/2020 concerning Freedom to Study at the University of Jember.



2. Vision, Mission, and Objective

2.1 Vision and Mission of University of Jember

Vision

To become a higher education institution with quality, environmental insight, and the ability to develop science, technology, and art (SciTechs) for the benefit of humanity, especially towards the development of agro-industry.

Mission

1. Improving the quality of the higher education tridharma and management system;
2. Increasing participation in environmental conservation;
3. Developing science, technology, and art for the welfare of society;
4. Fostering and developing a network of cooperation based on the principle of equality.

Objectives

1. To produce graduates who are intelligent, competitive, and adaptive;
2. To produce works of science, technology and art that are superior and of economic value, environmentally friendly, local wisdom and contributive to the community;
3. To build a superior work culture by strengthening the application of the quality assurance management system which is accountable, effective, and efficient based on information and communication technology;
4. To promote a nationally and internationally recognized Jember University

2.2 Vision, Mission and Objectives of the Faculty of Mathematics and Natural Sciences

Vision

Excellent in the development of environmentally sound mathematics, science and its applications.

Mission

1. to implement education in the fields of mathematics, science, and its applications that are international standard and environmentally friendly;
 2. to produce and develop science and technology through the research process and community service and environmental insight;
 3. to develop a transparent and accountable faculty governance system based on information technology;
 4. to develop a network of cooperation with domestic and foreign stakeholders.
-



Objectives

1. to produce graduates who are competitive and comparative in the region Southeast Asia and the Asian region;
2. to produce graduates who are superior works in the field of environmentally friendly science and technology, local wisdom and contribution to solving problems that exist in the community;
3. to realize a tradition of excellence work culture for all the Faculty of Mathematics and Natural Sciences, University of Jember residents by strengthening the implementation of an accountable, effective, efficient, and economical quality management system based on information and communication technology;
4. to realize the Faculty of Mathematics and Natural Sciences, University of Jember which is recognized in Southeast Asia and Asia.

2.2 Vision, Mission and Objectives of the Bachelor in Biology Study Program

Vision

Excellence in bioscience for the management of tropical biological resources with environmentally sound and globally competitive.

Visi Defined:

Excellence: highly competitive at national and global levels and have good ethics;

Bioscience: biology field study;

Management of tropical biological resources: conserving the potential for biodiversity in conservation and non-conservation areas in the tropics;

environmentally sound: manage natural resources without destroying the environment and foster sensitivity and concern for the environment

Mission

1. Organizing globally competitive bioscience learning oriented environmentally friendly management of tropical biological resources;
 2. Conducting resource management-oriented bioscience research innovative and productive tropical biodiversity with an environmental perspective;
 3. Organizing community service based on research results in the field of biosciences oriented to the management of tropical biological resources with an environmental perspective;
-



-
4. Improving cooperation in education, research and service to community at national and international levels.

Program Objective

The Bachelor in Biology Study Program organizes the Tri Dharma (three actions) of Higher Education with the aim of producing graduates who are:

1. excellent and have good ethics in applying bioscience to become bio-entrepreneurs and solve problems related to environmental management of tropical biological resources;
2. responsive and adaptive to the development of science and technology;
3. able to work professionally, independently, collaboratively, communicatively and be responsible and able to demonstrate leadership in the work environment and society
4. able to continue education to a higher level in the field of biology and other related fields.

Table 1. Program Objective (PO) at the Bachelor in Biology Study Program

Code	Description
PO1	Excellent and have good ethics in applying bioscience to become a bio-entrepreneur and solve problems related to environmental management of tropical biological resources
PO2	Responsive and adaptive to the development of science and technology
PO3	Able to work professionally, independently, collaboratively, communicatively and be responsible and able to demonstrate leadership in the work environment and society
PO4	Able to continue education to a higher level in the field of biology and other related fields



3. Curriculum Evaluation and Tracer Study

3.1 Curriculum Evaluation

a. Formatif Curriculum Evaluation

Evaluation of the planning, implementation and assessment of courses is carried out every semester by the course lecturers. Evaluation is carried out on learning methods, lecture and practicum materials, grading systems, references used, practicum tools and materials, and credit of each course. If among the components evaluated a problem is found, a discussion is carried out by the course lecturer until the solution is agreed. The results of the evaluation agreed upon by the course lecturer become the basis for improving learning tools, such as semester learning plans, lecture contracts, and syllabuses. Supporting learning tools such as practicum instructions, student worksheets, student assignment plans also adjust to the evaluation results.

In each semester, an evaluation is also carried out to determine the achievement of each Programme Learning Outcome (PLO). The study program sets a competency value of 75 and value of knowledge and skills successively 70. If the evaluation results show that the CPL value is equal to or greater than the standard, it means that the student already has the competencies, knowledge and skills expected by the study program. However, if the results of the evaluation of CPL achievement are less than the standard, it is indicated that there are problems in planning, implementing, and evaluating learning. The study program will look for the source of the problem and solve it.

b. Summative Curriculum Evaluation

1) Evaluation in 2017

After seven years from the odd semester of the 2010-2011 academic year to the even semester of 2016-2017 implementing a competency-based curriculum, towards the end of 2016 the Bachelor in Biology Study Program began to evaluate the curriculum. Curriculum evaluation was carried out in response to the issuance of Presidential Regulation of the Republic of Indonesia Number 8 of 2012, concerning the Indonesian National Qualifications Framework (INQF); Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 73 of 2013, concerning the Application of INQF in the Field of Higher Education; Regulation of the Minister of Research, Technology and Higher Education of the Republic of Indonesia Number 44 of 2015, concerning National Standards for Higher Education. Based on these government regulations, study programs are required to compile, implement and evaluate curricula that refer to the INQF.

In the INQF-based curriculum, study programs are required to establish graduate profiles and compile program learning outcomes (PLO) in accordance with educational level



qualifications which for the Bachelor in Biology Study Program are included in the level 6 category. In the preparation of the INQF-based curriculum, the Bachelor in Biology Study Program, Faculty of Mathematics and Natural Sciences, University of Jember established together the association in the field of biological sciences (Indonesian Biology Consortium, IBC). IBC establishes graduate profiles, knowledge and special skills PLOs, study materials in the field of biology (weevils of biological sciences) and megabiodiversity study materials of 20 credits. The curriculum team summarized the results of the meeting and brought them to the Biology Department meeting which the department meeting resulted in a decision that the graduate profile, PLO, study materials set by IBC became the basis for the study program to develop it and adapt it to the conditions of the study program. While the PLO elements of general attitudes and skills set by the government, at the Department Meeting are selected according to the conditions of the study program.

The graduate profiles set are academics (researchers, lecturers, and educators), professionals (technicians, quality control), employees and entrepreneurs. Meanwhile, 12 PLOs were established which included three PLO elements of attitude, three PLO elements of knowledge, three PLO elements of general skills and three PLO of specific skills. The study material which is a weevil of biological sciences follows the one set by IBC. Meanwhile, the megabiodiversity study materials are determined by the study program while still referring to the concepts set by IBC. The megabiodiversity study material then became the basis for the formation of several new courses, such as Basic Biosystematics, Mycology, Protists, Mangrove Ecology, Tropical Forest Ecology, Ecosystem Diversity, and Biogeography. In this 2017 curriculum change, new courses were also produced which were formed based on PLO and study materials that had been determined with elective status. The courses are Phytopharmaceuticals, Orchidology, Industrial Biotechnology, Health Biotechnology, Forensic Biology, Population Genetics, Molecular Genetics, Phytoremediation, Biological Resource Valuation, Bioinvasion Ecology, Health Microbiology, and Bioconversion. In addition, some elective courses have decreased the weight of credits from three credits to two credits. The courses are Animal Reproduction, Human Physiology, Immunology, Endocrinology, Parasitology, Animal Behavior, Entomology, Food Microbiology, Industrial Microbiology, Environmental Biomonitoring, Environmental Toxicology, and Plant Ecophysiology.

The curriculum team successfully completed the INQF-based curriculum in April 2017. The curriculum that has been formed is then socialized to students. This curriculum was implemented in the odd semester of the 2017-2018 academic year.

2) Evaluation in 2020



Regulation of the Minister of Education and Culture No. 3 of 2020 concerning National Standards for Higher Education is an effort by the government to align the world of higher education with the industrial revolution 4.0. In this regulation, the government requires universities to facilitate students to carry out an independent learning process, namely students have the option to carry out the learning process outside their study program for three semesters. The regulation was followed up by the Rector of the University of Jember with the issuance of the Rector's Regulation of the University of Jember No. 13532 / UN25 / EP / 2020 concerning freedom to study at the University of Jember. In order for the study program to carry out these obligations, a curriculum reconstruction was carried out from a INQF-based curriculum to a INQF-based curriculum with an outcome-based learning (OBE) approach to support the ILIC Program.

Curriculum reconstruction by the Bachelor in Biology Study Program, Faculty of Mathematics and Natural Sciences, University of Jember is coordinated by the curriculum team. The curriculum team attended various meetings that discussed the OBE curriculum, the ILIC program and how it was prepared. The curriculum team also communicates with potential partners who will be a place for students to learn outside the study program. The next process is the socialization of the OBE Curriculum supporting the ILIC Program to all lecturers of the Department of Biology and students. The next activity is a department meeting attended by all lecturers. The agenda of the meeting is to review the vision, mission, educational objectives, graduate profile, PLO, study materials, courses and their weights, course status, distribution of courses per semester.

The department meeting finally resulted in a decision that became the basis for reordering the study program curriculum. The decisions of the meeting include (1) the vision aligned with the vision of the university and faculty; (2) the mission, objectives, profile and PLO are prepared in an effort to realize the vision of the study program; (3) the distribution of courses each semester is rearranged so that the body of knowledge of biology can be completed in the fifth semester; (4) some courses have changed status, are deleted without being replaced with new courses, deleted and replaced with new courses, renamed and deleted practicum activities; (5) application of project base learning methods and case methods; (6) the inclusion of the ILIC Program; (7) each course must be equipped with learning tools that include a syllabus, semester learning plan, lecture contract, student worksheets, student assignment plan, portfolio and assessment rubric; (8) every semester a measurement of PLO achievement by the study program is carried out. This curriculum has been implemented since the odd semester of 2020-2021.



3.2 *Tracer Study*

A tracer study has been carried out on graduates who have graduated for the last five years in October 2021. The study is carried out through the Graduates Group for the Bachelor in Biology Study Program managed by the study program to facilitate communication between graduates and the study program. A questionnaire was sent via Google form and the questionnaire link was informed via WhatsApp. The results of the tracer study describe the suitability of graduates' profession with the competencies obtained from their study, current salary, first salary, the duration required to obtain a job, and the essential competencies for their profession which have not been trained during their study.

The tracer study results show that 63% of graduates work in the field of Biology, with the first salary over the minimum regional salary (MRS). In addition, 67% of graduates earn higher than MRS. Approximately, 77% of graduates need less than a year to get their first job. Meanwhile, the competencies needed by graduates to support their profession but missing in their study include the followings.

1. Learning materials are sufficient to support alumni's work;
2. Diverse practicum activities in several courses;
3. Internships in various industries;
4. Microteaching training;
5. Additional activities focusing on information and communication technology skills

The graduates voice many suggestions regarding the implemented curriculum to improve their employability. Some feel that the curriculum has sufficiently supported their work. A group of graduates working as quality-control staff underlines the need for additional material in practicum activities. Internships at institutions or industries need to be included in the curriculum. This is based on their first experience of engaging in a real-world profession where they need to adapt to their work and work environment. Internships are considered vital to introduce and bring students closer to the professional world. Graduates who work as teachers suggest the inclusion of microteaching to support their profession. Another suggestion is to add materials related to information technology and computers.

These suggestions can be accommodated by study programs, among others, by incorporating the Independent Learning Independent Campus (ILIC) program into the curriculum. Students can take part in one of the eight forms of learning activities in the program. As suggested adding internships to the curriculum, students can take part in internships or research or independent studies of ILIC program. Suggestions for including micro teaching in the curriculum can be followed up by following teaching assistance in educational units in the ILIC program on an independent campus. Suggestions for adding information technology and computer materials can also be



accommodated through student exchanges, internships, independent studies or other forms of learning activities in the ILIC program.



4. Graduate Profiles and Program Learning Outcomes (PLO)

4.1 Graduate Profile

The Graduates of the Bachelor in Biology are expected to be able to take part as a) research assistants in the fields of biology and the environment; b) quality control staff; c) bio-entrepreneur (Table 2). Determination of the graduate profile is based on input from stakeholders and alumni which is adjusted to the INQF level 6.

Table 2. Description of the Graduate's Profile at the Bachelor in Biology Study Program

No	Graduate Profile	Description
1	Research assistants in the fields of biology and the environment	A professional whose job is to assist research work in the biological and environmental fields under the supervision of senior staff
2	Quality control staff	A professional that is responsible for controlling food quality so that product quality meets standards or controls the quality of industrial waste to meet quality standards
3	Bio-entrepreneur	Entrepreneurs who work on tropical biological resource processing whose products are marketable, so they can earn profits.

4.2 The Formulation of Program Learning Outcomes (PLO)

a. The formulation of PLO based on Higher Education Standard and Indonesian Consortium Biology (ICB)

Program Learning Outcome includes attitude, general skills, knowledge, and specific skills. The attitudes and general skills are set by the government through *Permendikbud* No. 3 of 2020 concerning National Standards for Higher Education (Table 3). Meanwhile, the PLO for specific skills and knowledge is formulated in tandem with the Indonesian Biological Association, namely the Indonesian Biology Consortium (ICB) (Table 3).

Attitude deals with moral virtues as a result of internalizing and actualizing values and norms reflected in spiritual and social life throughout the learning process, students' internship, research, and/or community service. Knowledge is a systematic mastery of concepts, theories, methods, and/or philosophies of a particular discipline that is obtained through reasoning in the learning process, students' internship, research, and/or community service. General skills are essential to ensure the equality of graduates' abilities according to the level and type of higher education. Specific skills related to specific work skills which cohere with the study program.



Table 3. Attitudes and General Skills based on Higher Education Standard (*SN DIKTI*) and Knowledge as well as Specific Skills According to *KOBI*

No	Description of Program Learning Outcome (PLO)
Attitudes based on <i>SN DIKTI</i>	
A1	being pious to the God Almighty and able to show a religious attitude;
A2	upholding human values in performing tasks based on religion, morals, and ethics;
A3	contributing to the improvement of life quality and civilization in society, nation, and state based on <i>Pancasila</i> ;
A4	showing pride, love, nationalism, and a sense of responsibility to the country and nation;
A5	respecting the diversity of cultures, views, religions, and beliefs, as well as the opinions or original findings of others;
A6	cooperating and demonstrating social sensitivity and awareness of society and the environment;
A7	obeying the law in the life of society and the state;
A8	internalizing academic values, norms, and ethics;
A9	demonstrating the responsibility for work in the field of expertise; and
A10	internalizing the spirit of independence, struggle, and entrepreneurship
General Competences based on <i>SN DIKTI</i>	
GC1	applying logical, critical, systematic, and innovative thinking to develop and implement science and technology that pays attention to humanities values in respective expertise;
GC2	demonstrating independent, quality, and measurable performance;
GC3	examining the implications of the development or implementation of science and technology that pays attention to humanities values in respective expertise based on scientific principles, procedures, and ethics to produce solutions, ideas, art designs, or criticism; and composing a scientific report of their studies in the form of an undergraduate thesis or final project report and uploading it on the university's website;
GC4	compiling a scientific report of research results in the form of an undergraduate thesis or final project report, and uploading it on the university's website;
GC5	making appropriate decisions to solve problems in the area of expertise by relying on information and data analysis;



GC6	maintaining and developing a network with supervisors and colleagues, both inside and outside the university;
GC7	being responsible for the achievement of group work and evaluating the group work completion;
GC8	performing self-evaluation of group work and managing learning independently;
GC9	documenting, storing, securing, and retrieving data to ensure validity and prevent plagiarism.
Specific Competences based on ICB	
SC1	presenting solutions in solving problems related to Biology through the application of knowledge, biological methods, and relevant technologies in a monodisciplinary manner;
SC2	applying biological concepts in daily life to benefit the society;
SC3	managing biological resources and the environment in a specific scope.
Knowledge based on ICB	
K1	mastering the principles of biology and biological resources as well as the environment;
K2	mastering relevant biological and technological concepts to manage biological resources and their environment;
K3	mastering the basic principles of software applications, basic instruments, standard methods for analysis and synthesis in general and specific biological fields.

b. Reformulation of PLO at the Bachelor in Biology Study Program

The graduate of Bachelor in Biology study program are essential to help formulate one of the three predetermined graduate profiles if they master graduate competency standards. Graduate competency standard is the minimum criteria regarding the qualifications of graduates' attitudes, knowledge, and skills stated in the PLO.

PLO of the Bachelor in Biology study program are determined through a meeting that is attended by all lecturers. PLO concerning attitudes and general skills are determined by referring to PLO based on *SN DIKTI* to characterize graduates' expected competencies. PLO related to knowledge and general skills are determined by referring to ICB's PLO laden with the local content of the study program. The overall PLOs of the Bachelor in Biology study program are shown in Table 4 below.

Table 4. PLOs and Indicators



Code	PLOs	Code	Indicators
Attitude			
PLO1	able to internalize norms and ethics based on Pancasila in working independently or in groups	1.a	showing an honest attitude and responsibility as the practice of Pancasila
		1.b	working individually or in team works
Knowledge			
PLO2	able to analyze the principles of biology, mathematics, and other relevant natural sciences	2a	analyzing the basic concepts of biology, mathematics, other relevant natural sciences
		2b	correlating the basic concepts of science (physics, chemistry, mathematics) with the principles of biology
PLO3	Able to analyze the principles of molecular biology, cells, organisms and management of tropical biological resources	3.a	Describing the principles of molecular biology, cells and organisms
		3.b	analysing biological principles that are relevant to the problem of biological resources management in tropics
General skills			
PLO4	able to implement scientific methods for the biological resources management and commercial products development in tropics	4.a	implementing scientific methods for the management of biological resources in tropics
		4.b	demonstrating scientific methods for development of commercial products from the tropical natural resources
PLO5	able to implement the logic of critical thinking on biosafety and environmental issues related to the field of biology with a scientific and bioethical approach	5.a	implementing the logic of critical thinking on biosafety related to the field of biology with a bioethics approach for better environmental awareness
		5.b	using the logic of critical thinking on environmental issues related to



			the field of biology with a scientific and bioethics approach
Special skills			
PLO6	Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implement.	6.a	practising laboratory and/or field works independently and in groups
		6.b	using software applications and/or basic instruments for sampling and analysis in biology and environmental fields
PLO7	able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results.	7.a	integrating bioscience in problems solving related to the management of biological resources in tropics
		7.b	presenting the results of problems solving related to the management of biological resources in tropics

c. The compatibility matrix of PLO *SN DIKTI* and ICB with Reformulated PLOs of the Bachelor in Biology Study Program

The coherence between PLOs involving attitudes and general skills endorsed in *SN DIKTI* and those integrating knowledge and specific competencies recommended by ICB which include specific knowledge and skills concerning reformulated PLOs of the Bachelor in Biology study program is shown in Table 5 below.

Table 5. The Compatibility Matrix of PLOs *SN DIKTI*, ICB and Reformulated PLOs at the Bachelor in Biology Study Program

PLOs <i>SN DIKTI</i>		PLOs Bachelor in Biology Study Program						
		1	2	3	4	5	6	7
A8	internalizing academic values, norms, and ethics;	√						
A9	demonstrating the responsibility for work in the field of expertise;	√						
GC1	applying logical, critical, systematic, and innovative thinking to develop and implement science and technology that pays					√		



	attention to humanities values in respective expertise;							
GC5	making appropriate decisions to solve problems in the area of expertise by relying on information and data analysis;				√			
PLOs ICB		1	2	3	4	5	6	7
K1	mastering the principles of biology and biological resources as well as the environment;			√				
K2	mastering relevant biological and technological concepts to manage biological resources and their environment;		√					
K3	mastering the basic principles of software applications, basic instruments, standard methods for analysis and synthesis in general and specific biological fields.						√	
SC1	presenting solutions in solving problems related to Biology through the application of knowledge, biological methods, and relevant technologies in a monodisciplinary manner;							√
SC3	managing biological resources and the environment in a specific scope.						√	



d. Correlation Between PLOs and Graduate Profiles (GP) of the Bachelor in Biology Study Program

The correlation between PLOs and Graduate Profiles (GP) is presented in Table 6.

Table 6. Matrix of the Correlation between PLOs and Graduates Profiles (GP)

No	PLOs	GP1	GP2	GP3
1	able to internalize norms and ethics based on Pancasila in working independently or in groups	√		√
2	able to analyse the principles of biology, mathematics, and other relevant natural sciences	√	√	
3	able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources	√	√	√
4	able to implement scientific methods for the biological resources management and commercial products development in tropics	√	√	√
5	able to implement the logic of critical thinking on biosafety and environmental issues related to the field of biology with a scientific and bioethics approach	√	√	
6	able to do laboratory work and/or in the field independently and/or in groups for biological concepts implement	√	√	
7	able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results	√	√	

e. Correlation between PLOs and Program Objectives (POs) of the Bachelor in Biology Study Program

The correlation between PLOs and program objectives (POs) is described in Table 7.

Table 7. Matrix of the correlation between PLOs and Program Objectives (POs)

No	PLOs	TP1	TP2	TP3	TP4
1	able to internalize norms and ethics based on Pancasila in working independently or in groups	√		√	
2	able to analyse the principles of biology, mathematics, and other relevant natural sciences	√		√	√
3	able to analyse the principles of molecular biology, cells, organisms and management of tropical biological	√			√



	resources				
4	able to implement scientific methods for the biological resources management and commercial products development in tropics	√	√	√	√
5	able to implement the logic of critical thinking on biosafety and environmental issues related to the field of biology with a scientific and bioethics approach	√	√		√
6	Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implement	√	√	√	√
7	able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results.	√	√	√	√



5 The Determination of Study Materials

5.1 *Body of Knowledge (BoK)*

The body of knowledge of the Bachelor in Biology Study Program includes six scientific fields. These were formulated at the Assembly of Coordinators of Bachelor in Biology Study Program in Indonesia on October 31, 2013.

1. **Cell Biology and Molecule** studies the organization of living things at the cellular and subcellular levels;
2. **Physiology** explores the processes in living systems;
3. **Genetics** studies the substance of genes and the processes of inheritance to ensure the survival of living systems;
4. **Structure and Development** delves into individual-level organizations and the ontogenetic changes of these organizations;
5. **Biosystematics and Evolution** investigates the diversity of living things and their phylogenetic history;
6. **Ecology and Conservation** studies the organization of individual interactions at various levels ranging from population, community, and ecosystem to the biosphere.

Graduates of the Bachelor in Biology Study Program can have graduate competency standards if the established study materials support their achievement. The study material is the basis for the formation of the course and its credit. Seven PLO's will be charged on each of the courses. At the end of the semester, the value of each PLO is measured to determine the level of achievement. The value standards of each PLO have been set by the study program. The study program sets a competency PLO (PLO 1 and PLO 5) value standard of 75 and a PLO value standard of knowledge and skills (PLO 2, PLO 3, PLO 4, PLO 6 and PLO 7) of 70 each. The relationship between PLO and the study material is summarized in Table 8 below.

Table 8. Study Materials based on PLOs

No.	PLOs	Study Materials
1.	able to internalize norms and ethics based on Pancasila in working independently or in groups	Microbiology, Cell Biology, Systematic, Physiology, Genetic, Ecology, Conservation
2.	able to analyze the principles of biology, mathematics, and other relevant natural sciences	Cell Biology, Physiology, Ecology



3.	able to analyze the principles of molecular biology, cells, and organisms	Microbiology, Structure, Cell Biology, Development, Ecology, Genetic, Systematic, Molecular Biology, Physiology, Evolution, Conservation
4.	able to implement scientific methods for the biological resources management and commercial products development in tropics	Conservation
5.	able to implement the logic of critical thinking on biosafety and environmental issues related to the field of biology with a scientific and bioethics approach	Microbiology
6.	able to do laboratory work and/or in the field independently and/or in groups for biological concepts implement	Microbiology, Structure, Physiology, Development, Ecology, Genetic, Systematic, Molecular Biology, Evolution, Conservation
7.	able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results.	Development

5.2 The Description of Study Materials

The standard of study materials refer to the body of biological knowledge and guide the formulation of learning content in each course. The materials were formulated at the ICB meeting on 15-16 October 2014, 5-6 December 2014, and 5 June 2015 (Table 9).

Tabel 9. The Description of the *Body of Knowledge* at the Bachelor in Biology Study Program

No.	Study Materials	Description of Study Materials
1	Cell Biology and Molecular	Cell: theory and history of discovery, types and structures of organelles and their functions, replication, gene expression and regulation, cycles and division, interactions with the environment Biomolecule: carbohydrates, lipids, proteins, nucleic acids genetic engineering: recombinant DNA, cloning
2	Physiology	Plant Physiology:



		<p>water, nutrients, photosynthesis, respiration, secondary metabolism, growth regulators, locomotion, dormancy and germination, response to the environment</p> <p>Animal physiology: homeostasis, coordination of nerves and hormones, movement, digestion, respiration, circulation, excretion, immunity, hibernation and arousal</p> <p>Microbial Physiology: nutrition, respiration, fermentation, growth, secondary metabolism, response to the environment</p>
3	Genetic	<p>Genetic Material: structure, genotype and phenotype, and the factors that influence it</p> <p>Inheritance: Mendel's laws, principles of pedigree analysis, modification of Mendelian Principles, sex determination, gene linkage</p> <p>Population Genetics: changes in gene frequency due to selection, migration, mutation.</p>
4	Structure and Development	<p>Morphology and Anatomy Embryogenesis, Morphogenesis, Organogenesis Regeneration, In Vitro Culture Method</p>
5	Biosystematics and Evolution	<p>Fundamental Principles of Taxonomy: identification, description, classification, character as taxonomic evidence, species concept, nomenclature, taxa recognition</p> <p>Phylogeny: phylogenetic and phenetic approaches</p> <p>Evolution: mechanism, scientific evidence, speciation and its implications</p>
6	Ecology and Conservation	<p>Ecology: concept of population and community, habitat and ecological niche, interaction of organisms with their environment, food web and food chain, ecosystem</p> <p>Population Ecology: population dynamics and limiting factors</p> <p>Community Ecology: succession and community dynamics.</p> <p>Biodiversity: scope, biodiversity value, and the factors that influence it.</p> <p>Bio-Conservation: basic principles, ecosystem services, conservation design and management</p>



		Environmental Science: environmental elements, environmental quality, environmental issues, water resources, soil and rocks
--	--	---

6. Formation of Courses and Course Credits

Courses are formed based on PLOs which is also included in each study material and grouped into four groups, as follows:

a.	General Compulsory Courses	: compulsory courses at university and faculty level
b.	Specific Compulsory Courses	: compulsory courses at the study program level (including the body of knowledge)
c.	Elective Courses	: elective courses at the study program level
d.	Final Project	: undergraduate thesis writing

General compulsory courses include University Compulsory Courses of 11 credits and Faculties of 24 credits. The special compulsory course is the Compulsory Course of the Bachelor in Biology Study Program which has 74 credits. The minimum elective course that students must program is 29 credits. Elective courses are courses based on five groups of fields of science in the study program, namely Zoology, Botany, Microbiology, Ecology and Biotechnology. The elective courses provided are as many as 78 credits for students to choose according to the field of science they are interested in. The final project of 6 credits is taken by students in the final semester of lectures.

The determination of courses and their credits uses a matrix that connects the names and weights of the courses with PLOs. The matrix showing course names and weights along with their targeted PLOs is shown in Table 10 below.

Table 10. Matrix of Correlation between PLOs and Courses

No	Modules	Credits (C-P)	PLOs													
			1		2		3		4		5		6		7	
			A	B	A	B	A	B	A	B	A	B	A	B	A	B
The 1st Semester																
General Compulsory																



1.	Calculus	3-1			√								√	√		
2.	General Physics	3-1			√								√	√		
3.	Basic Chemistry	3-1			√								√	√		
4.	Fundamental Biology	3-1			√								√	√		
5.	Religion Education: Islamic Christian Catholic Hinduism Buddhism	2-0	√	√	√											
6.	English	2-0	√	√	√											

The 2nd Semester

a. General Compulsory

7.	Indonesian	2-0	√	√	√											
8.	Civic Education	2-0	√		√											

b. Specific Compulsory

9.	Microbiology	2-1		√			√						√	√		
10.	Plant Structure	3-1					√						√	√		
11.	Animal Structure	3-1					√						√	√		
12.	Cell Biology	2-0		√			√									
13.	Biochemistry	2-1					√						√	√		

The 3rd Semester

a. General Compulsory

14.	Pancasila Education	2-0	√		√											
15.	Introduction to Environmental Science	2-0		√	√							√				√



b. Specific Compulsory														
16.	Microbial Physiology	2-1		√			√					√	√	
17.	Plant Development	2-1					√					√		
18.	Animal Development	2-1		√			√					√		
19.	Terrestrial Ecology	2-1	√				√					√	√	
20.	Genetics	3-1		√			√					√	√	
The 4th Semester														
Specific Compulsory														
21.	Molecular Biology	3-1					√					√	√	
22.	Plant Systematic	3-1					√					√		
23.	Animal Systematic	3-1	√				√					√		
24.	Aquatic Ecology	2-1				√			√			√	√	
25.	Evolution	3-0					√					√		
26.	Microtechnique	1-1						√				√		
The 5th Semester														
Specific Compulsory														
27.	Plant Physiology	3-1		√		√	√					√	√	
28.	Animal Physiology	3-1		√		√	√					√	√	
29.	Environmental Science	1-1		√	√						√	√		
30.	Biostatistics	2-0			√	√							√	
31.	Tissue Culture	1-1		√				√				√		√



	Elective Courses*	6																
The 6th Semester																		
Specific Compulsory																		
32.	Research Methodology	2-0														√	√	√
33.	Bioinformatics	1-1			√											√		
34.	Biology Conservation	2-0		√				√	√						√			
	Elective Courses*	14																
The 7th Semester																		
a. General Compulsory																		
35.	Community Services Training	0-3	√							√				√			√	√
36.	Occupational Safety and Health	2-0		√	√									√				
37.	Introduction to Entrepreneurship	2-0	√							√								
b. Specific Compulsory																		
38.	Bioethics	2-0	√															
	Elective Courses*	9																
The 8th Semester																		
39.	Final Project	0-6	√							√					√	√	√	√
*Elective Courses																		
40.	Food Microbiology	1-1					√				√		√					
41.	Health Microbiology	1-1					√		√				√	√				√



42.	Enzymology	2-0		√			√								
43.	Industrial Microbiology	1-1					√			√			√	√	
44.	Virology	1-1					√						√		√
45.	Microbiological Analysis Technique	1-1					√						√	√	
46.	Bioconversion	2-0					√		√						√ √
47.	Mycology	1-1					√			√			√		√
48.	Ethnobotany	1-1			√			√		√			√		
49.	Ornamental Plant	1-1			√			√		√			√		
50.	Natural Medicine	2-0						√							√ √
51.	Bryology	1-1			√			√					√		√ √
52.	Phytohormone	1-1					√						√		√ √
53.	Plant Ecophysiology	1-1					√		√				√	√	√
54.	Orchidology	2-0						√							√ √
55.	Animal Reproduction	1-1					√			√			√		
56.	Parasitology	1-1					√	√					√		
57.	Animal Behaviour	2-0					√								√
58.	Entomology	1-1					√	√		√			√		
59.	Endocrinology	2-0				√	√								√
60.	Human Physiology	1-1					√						√		
61.	Ecotourism	2-0						√		√					√ √



62.	Valuation of Biological Resources	1-1					√					√	√	√
63.	Environmental Biomonitoring	1-1			√						√		√	√
64.	Biogeography	1-1					√					√	√	√
65.	Wildlife Management	2-0					√	√					√	√
66.	Bio-invasion Ecology	2-0					√	√						√
67.	Phytoremediation	1-1			√						√		√	√
68.	Coastal Area Management	2-0					√	√						√
69.	Mangrove Ecology	2-0		√			√							√
70.	Tropical Forest Ecology	2-0		√			√							√
71.	Forensic Biology	2-0					√							√
72.	Industrial Biotechnology	2-0					√							√
73.	Plant Biotechnology	2-1					√			√		√		
74.	Health Biotechnology	2-1					√					√		
75.	Molecular Genetics	2-0				√								√
76.	Population Genetics	2-0				√							√	
77.	Immunology	1-1				√	√					√	√	





7. Course Organization at the Bachelor in Biology Study Program

Course organization in each semester is determined by considering the depth and goals of course material as the foundation for understanding other related courses in the following semester. The depth of each course increasingly develops from semester 1 to semester 8. In the initial semesters, students are prepared to **analyze** the principles of biology, cells, molecules, mathematics, and natural sciences. In the middle semesters, they learn to **implement** biological concepts and scientific methods to pave their critical and logical reasoning in the management of tropical biological resources. In the later semesters, they learn to **solve** tropical biological problems. The course organization is shown in Figure 1 below.

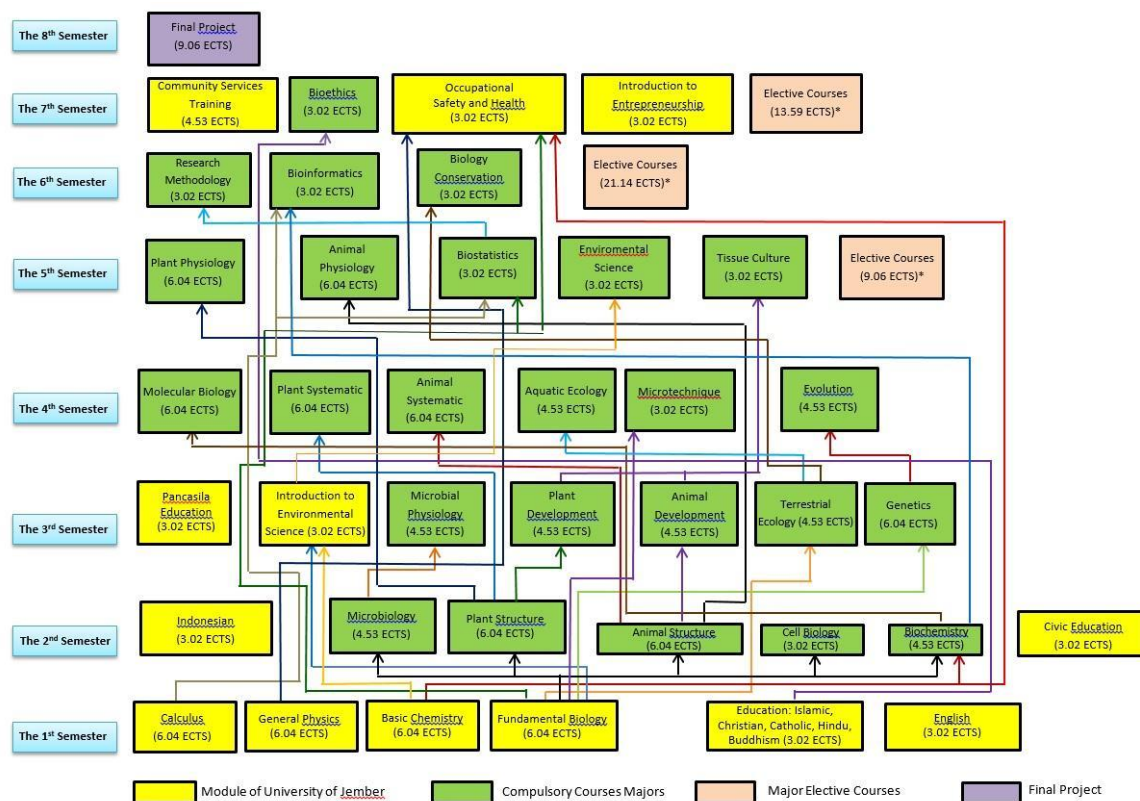


Figure 1. Course Organization at the Bachelor in Biology Study Program



8. Course Distribution

Bachelor in Biology Study Program stipulates a minimum study load of 144 credits and a maximum of 160 credits (Permendikbud No. 3 of 2020 concerning National Standards of Higher Education). The minimum load consists of 35 general compulsory courses, 74 credits of specific compulsory courses, 29 credits of elective courses, and 6 credits of final-project courses. The maximum load with 160 credits involves 45 credits for elective courses in total. Students are required to take elective courses that support their final project plan. In this case, the academic supervisor is obliged to direct the students upon determining the elective courses.

Students can complete their education in 8 – 10 semesters or less than 8 semesters (Education Guidelines of Universitas Jember for 2020-2021 Academic Years). The longest duration of study accomplishment is 14 semesters (Permendikbud No. 3 of 2020 concerning National Standards of Higher Education). The total load that can be taken in semesters 1 and 2 is 20 credits, with the bundle system applied. In the system, in semester 2 all students take 20 credits regardless of their GPA in semester 1. In semester 3, the load taken is determined by the GPA in semester 2, and this applies to the next semesters. The course distribution is shown in Table 11 below.

Students can program Community Service Training if they have taken courses with a load of 110 credits. The Final Project can be programmed if the student has taken lectures with a minimum load of 120 credits, a minimum GPA of 2, and an achievement percentage of 85%.

Table 11. Course Distribution at the Bachelor in Biology Study Program

No	Code	Module	Credits				Prerequisite
			Theory	Practice	Credits	ECTS	
The 1st Semester							
1	MAU 1101	Calculus	3	1	4	6.04	-
2	MAU 1102	General Physics	3	1	4	6.04	-
3	MAU 1103	Basic Chemistry	3	1	4	6.04	-
4	MAU 1104	Fundamental Biology	3	1	4	6.04	-
5	MPK 9001 MPK 9002 MPK 9003	Religion Education: Islamic Christian Catholic	2	0	2	3.02	-



	MPK 9004 MPK 9005	Hindu Buddhism					
6	MAU 1105	English	2	0	2	3.02	
Total credit of 1st semester					20	30.2	
The 2nd Semester							
1	MPK 9001	Indonesian	2	0	2	3.02	-
2	MAB 1201	Microbiology	2	1	3	4.53	MAU 1104
3	MAB 1202	Plant Structure	3	1	4	6.04	MAU 1104
4	MAB 1203	Animal Structure	3	1	4	6.04	MAU 1104
5	MAB 1205	Cell Biology	2	0	2	3.02	MAU 1104
6	MAB 1206	Biochemistry	2	1	3	4.53	MAU 1103, MAU 1104
7	MPK 9006	Civic Education	2	0	2	3.02	-
Total credit of 2nd semester					20	30.2	
The 3rd semester							
1	UNU 9001	Pancasila Education	2	0	2	3.02	-
2	MAU 1009	Introduction to Environmental Science	2	0	2	3.02	-
3	MAB 1301	Microbial Physiology	2	1	3	4.53	MAB 1201
4	MAB 1302	Plant Development	2	1	3	4.53	MAB 1202
5	MAB 1303	Animal Development	2	1	3	4.53	MAB 1203
6	MAB 1304	Terrestrial Ecology	2	1	3	4.53	MAU 1104
7	MAB 1406	Genetics	3	1	4	6.04	MAU 1104
Total credit of 3rd semester					20	30.2	
The 4th semester							



1	MAB 1306	Molecular Biology	3	1	4	6.04	MAB 1206
2	MAB 1402	Plant Systematic	3	1	4	6.04	MAB 1202
3	MAB 1403	Animal Systematic	3	1	4	6.04	MAB 1203
4	MAB 1404	Aquatic Ecology	2	1	3	4.53	MAB 1304
5	MAB 1601	Microtechnique	1	1	2	3.02	MAU 1104
6	MAB 1603	Evolution	3	0	3	4.53	MAB 1406
Total credit of 4th semester					20	30.2	
The 5th semester							
1	MAB 1502	Plant Physiology	3	1	4	6.04	MAB 1202
2	MAB 1503	Animal Physiology	3	1	4	6.04	MAB 1203
3	MAB 1504	Biostatistics*	2	0	2	3.02	MAU 1101, MAU 1104
4	MAB 1505	Environmental Science	1	1	2	3.02	MAU 1105
5	MAB 1522	Tissue Culture	1	1	2	3.02	MAB 1302, 1303
6		Elective Courses			6	12.08	Please see Table 12
Total credit of 5th semester					20	30.2	
The 6th semester							
1	MAB 1006	Research Methodology	2	0	2	3.02	MAB 1504
2	MAB 1307	Bioethics**	2	0	2	3.02	MPK 9001-9005
3	MAB 1506	Bioinformatics**	1	1	2	3.02	MAU 1101, MAB 1206,
4	MAB 1605	Biology Conservation	2	0	2	3.02	MAB 1304
5		Elective Courses			12	31.71	Please see Table 12



Total credit of 6 th semester					20	30.2	
The 7th semester							
1	MAU 1008	Community Services Training	0	3	3	4.53	Have taken ≥ 110 credits / 166.1 ECTS
2	MAU 1007	Introduction to Entrepreneurship*	2	0	2	3.02	MAU1102, 1103,1104
3	MAU 1010	Occupational Safety and Health*	2	0	2	3.02	MAU 1102, MAU 1103, MAU 1104
		Elective Courses			11		Please see Table 12
Total credit of 7 th semester					18	27.18	
The 8th semester							
1	MAU 1811	Final Project	0	6	6	9.06	GPA of ≥ 2 ; Have taken ≥ 120 credits/ 181.2 ECTS; PP 85%
Total credit of 8 th semester					6	9.06	
Total credit					144	217.44	

* can be programmed by 3rd semester students whose GPA ≥ 3

** can be programmed by 4th semester students whose GPA ≥ 3

The Elective course distribution of Bachelor in Biology based on research group is provided in Table 12.

Table 12. Elective Course Distribution at the Bachelor in Biology Study Program based on Research Group (starting at 5th semester)

No	Code	Modules	Semester	Theory	Practice	Credits	ECTS	Prerequisite
----	------	---------	----------	--------	----------	---------	------	--------------



A. Microbiology Research Group Courses								
1	MAB 1401	Mycology	odd	1	1	2	3.02	MAB 1201
2	MAB 1507	Food Microbiology	odd	1	1	2	3.02	MAB 1301
3	MAB 1524	Enzymology	odd	2	0	2	3.02	MAB 1301
4	MAB 1608	Virology	odd	1	1	2	3.02	MAB 1201
5	MAB 1508	Health Microbiology	even	1	1	2	3.02	MAB 1301
6	MAB 1607	Industrial Microbiology	even	1	1	2	3.02	MAB 1301
7	MAB 1609	Microbiological Analysis Techniques	even	1	1	2	3.02	MAB 1301
8	MAB 1610	Bioconversion	even	2	0	2	3.02	MAB 1301
B. Botany Research Group Courses								
1	MAB 1510	Ethnobotany	odd	1	1	2	3.02	MAB 1402
2	MAB 1511	Ornamental Plant	odd	1	1	2	3.02	MAB 1402
3	MAB 1513	Bryology	odd	1	1	2	3.02	MAB 1402
4	MAB 1523	Natural Medicine	odd	2	0	2	3.02	MAB 1206
5	MAB 1611	Phytohormone	even	1	1	2	3.02	MAB 1502
6	MAB 1612	Plant Ecophysiology	even	1	1	2	3.02	MAB 1304, MAB 1502
7	MAB 1613	Orchidology	even	2	0	2	3.02	MAB 1402
C. Zoology Research Group Courses								
1	MAB 1514	Animals Reproduction	odd	1	1	2	3.02	MAB 1303
2	MAB 1515	Parasitology	odd	1	1	2	3.02	MAB 1403
3	MAB 1516	Animal Behaviour	odd	1	1	2	3.02	MAB 1403
4	MAB 1614	Entomology	even	1	1	2	3.02	MAB 1403
5	MAB 1615	Endocrinology	even	2	0	2	3.02	MAB 1503



6	MAB 1617	Human Physiology	even	1	1	2	3.02	MAB 1503
D. Ecology Research Group Courses								
1	MAB 1501	Biogeography	odd	2	0	2	3.02	MAU 1104
2	MAB 1517	Ecotourism	odd	2	0	2	3.02	MAB 1304, MAB 1404
3	MAB 1518	Valuation of Biological Resources	odd	1	1	2	3.02	MAB 1304, MAB 1404
4	MAB 1519	Environmental Biomonitoring	odd	1	1	2	3.02	MAB 1505
5	MAB 1602	Tropical Forest Ecology	even	2	0	2	3.02	MAB 1304
6	MAB 1604	Mangrove Ecology	even	2	0	2	3.02	MAB 1404
7	MAB 1619	Bioinvasion Ecology	even	2	0	2	3.02	MAB 1304, MAB 1404
8	MAB 1620	Phytoremediation	even	1	1	2	3.02	MAB 1505
9	MAB 1621	Coastal Area Management	even	2	0	2	3.02	MAB 1404
10	MAB 1627	Wildlife management	even	2	0	2	3.02	MAB 1304
E. Biotechnology Research Group Courses								
1	MAB 1520	Forensic Biology	odd	2	0	2	3.02	MAB 1206
2	MAB 1521	Industrial Biotechnology	odd	2	0	2	3.02	MAB 1306
3	MAB 1624	Molecular Genetics	odd	2	0	2	3.02	MAB 1306
4	MAB 1625	Population Genetics	odd	2	0	2	3.02	MAB 1406
5	MAB 1622	Plant Biotechnology	even	2	1	3	4.53	MAB 1306
6	MAB 1623	Health Biotechnology	even	2	1	3	4.53	MAB 1306



7	MAB 1616	Immunology	even	1	1	2	3.02	MAU 1104
---	----------	------------	------	---	---	---	------	----------

9. Semester Learning Design

The planning of the learning process is prepared for each course and presented in the semester learning plan. Semester learning plans are determined and developed by lecturers independently or together in a group of expertise in a field of science and / or technology in the study program. The Semester Learning Plan contains at least:

1. the name of the study program, the name and code of the course, semester, credits, the name of the lecturer;
2. graduate learning outcomes charged to the course;
3. final ability planned at each stage of learning to meet the learning outcomes of graduates;
4. study materials related to the ability to be achieved;
5. learning methods;
6. the time allotted to achieve abilities at each stage of learning;
7. student learning experience embodied in the description of the tasks that must be done by the student for one semester;
8. criteria, indicators and weights of assessment;
9. list of references used.

Semester learning plans must be reviewed and adjusted regularly to the development of science and technology.

1. PLO, PLO charged on courses, LO courses, Sub-LO Courses, Sub-LO Courses (Sub-LO, assessment indicators, assessment criteria, learning forms, learning methods, learning materials, assessment weights contained in the semester learning plan are described as follows:
2. Program Learning Outcomes (PLO) are abilities possessed by each study program graduate which is an internalization of attitudes, mastery of knowledge and skills in accordance with the level of their study program obtained through the learning process. The PLO imposed on the course (CLO) is some of the learning outcomes of study program graduates which are used for the formation / development of a course consisting of aspects of attitude, general harmony, special skills and knowledge.



3. Course Learning Outcome (CLO) is the ability that is specifically described from the PLO charged to the course, and is specific to the study material or learning material of the course.
4. Sub-CLO is an ability that is specifically described from CLO that can be measured or observed and is the final ability that is planned at each stage of learning, and is specific to the learning material of the course.
5. Assessment indicators are abilities in the student learning process and outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. Assessment Criteria is a benchmark that is used as a measure or benchmark for the achievement of learning in assessment based on predetermined indicators. Assessment criteria is a guideline for appraisers so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. Forms of assessment: test and non-test.
8. Forms of learning: lectures, responses, tutorials, seminars or equivalent, practicum, studio practice, workshop practice, field practice, research, community service and/or other equivalent forms of learning.
9. Learning Methods: small group discussion, role-play & simulation, discovery learning, self-directed learning, cooperative learning, collaborative learning, contextual learning, project based learning, and other equivalent methods.
10. Learning Material is a detail or description of the study material that can be presented in the form of several points and sub-subjects.
11. The assessment weight is the percentage of assessment of each sub-CLO achievement which is the magnitude of which is proportional to the difficulty of achieving the sub-CLO, and the total is 100%.
12. TM=Face-to-Face, PT=Structured assignment, BM=Self-study.



10. The Implementation of Independent Learning-Independent Campus Programs

10.1 Forms, Organizers, and Requirements of Learning Activities

The Bachelor in Biology Study Program of Mathematics and Natural Sciences Faculty, University of Jember applies the Independent Learning-Independent Campus (ILIC) Program starting in the even semester of the 2020-2021 academic year. Eight forms of learning activities of the ILIC Program are facilitated by study programs for students to participate in. The forms of learning activities include:

1. Student Exchange
2. Internships/Work Practices
3. Teaching Assistance in Education Unit
4. Research
5. Humanitarian Projects
6. Entrepreneurial Activities
7. Independent Studies/Projects
8. Village Development/Thematic Student Study Service

The forms of learning activities of the ILIC can be organized by the Faculty of Mathematics and Natural Sciences (FMIPA) or the Bachelor in Biology Study Program through cooperation agreements or MoUs with partners or programs offered and organized by the Ministry of Education, Culture, Research, Technology and Higher Education (Kemendikbud Ristekdikti). Students before registering at one of the activities are required to consult with an academic advisory lecturer and get approval from the study program coordinator.

The maximum lecture load that can be converted with learning activities carried out through the ILIC Program is 20 credits or determined by Kemendikbud Ristekdikti. If the student's right in that semester is 24 credits, the remaining burden is taken at the Bachelor in Biology Study Program, FMIPA, University of Jember.

Student Exchange organized by the study program can be programmed by 5th semester students with the condition that the $GPA \geq 3$ and the compulsory courses of the study program that must be taken in semester 5 are prioritized to be taken in partner study programs, and then followed by elective courses. Meanwhile, seven other activities organized by study programs or faculties or Kemendikbud Ristekdikti can be followed by students in semesters 6 and 7 who have taken ≥ 84 credits of



biology core courses or biology bodies of knowledge with a GPA of ≥ 3 .

Students who are interested in participating in the ILIC Program organized by Kemendikbud Ristekdikti or National Innovation Research Agency (BRIN) must have an account by registering on the <https://kampusmerdeka.kemdikbud.go.id> or <https://elsa.lipi.go.id> depending on the type of program offered.

10.2 Student Exchange

a. Objectives

Increasing insight into single diversity and enthusiasm in upholding the unity and unity of the student nation, as well as reducing the gap in the learning process that is still found in Indonesia.

b. Student Exchange Partnership

Students prepare the completeness of the requirements (transcript), then register in the partner study program through the link provided by the partner. Students who have been declared accepted by the partner study program upload a study plan card, write the student's ID number, courses and semester learning plans or syllabus from the partner on the ILIC menu on the Integrated Information System (SISTER) of the University of Jember. If the remaining credits are also taken, then students also program a regular study plan by attending lectures at the Bachelor in Biology Study Program at the University of Jember. The next stage is for students to take part in learning in partner study programs as a learning process for ILIC and in the original study program as regular lectures. The ILIC learning assessment will be given by the lecturer of courses in the partner study program at the end of the semester and reported by the student to the Head of Study Program. The head of study program will convert the course and enter his grades at Sister Jember University.

c. Student Exchanges of The Kemendikbud Ristekdikti

The student exchange programs that have been offered by the ministry include the Permata Sakti Student Exchange (PPS), Independent Student Exchange (PPM), International Credit Transfer (ICT), and Indonesian International Student Mobility Awards (IISMA). Students who register must meet the requirements set by the Kemendikbudristekdikti. Destination universities are generally set by the government or handed over to students depending on the type of program. Students who are declared accepted, must complete the filling on the ILIC menu at SISTER University of Jember.

d. Lectures at the Bachelor in Biology Study Program, FMIPA, University of Jember for Partner

The Bachelor in Biology Study Program at the University of Jember also accept students from partner to study in this study program. The courses offered are courses that are already available on the ILIC SISTER University of Jember web. Students from partner



apply through <https://sister.unej.ac.id/merdekabelajar>. After being accepted, students will get student's ID Number and Study Plan Card from the University of Jember and students have sister access to the University of Jember during the study lasts one semester. Access to SISTER is used to conduct attendance, collect assignments, take exams and get study report sheet.

10.3 Internship / Work Practice

a. Objectives

Increase student work experience and competence in the real professional world, hard skills (such as skills, complex problem solving, analytical skills) and soft skills (such as professional / work ethics, communication, cooperation) as well as update teaching materials, learning, and lecturer research topics that are relevant to the world of work.

b. Internship / Work Practice Partnership

Students can take part in internships held by study programs at partner institutions such as the Indonesian Coffee and Cocoa Research Center, Meru Betiri National Park, or the Orange and Subtropical Fruit Plant Research Center, Ministry of Agriculture, in Batu. Students complete the requirements (transcripts, CVs, proposals or internship plans) then register for the study program. The study program will send student data to partners. The partner will make a selection and announcement. Students who are accepted do study plan programming on the ILIC menu at Sister University of Jember. There are also internships that can be converted with the courses listed in Table 13.

Table 13. Descriptions and courses that can be converted to internships / work practices at PPKKI, TN Meru Betiri, and Balitjestro

1. Indonesian Coffee and Chocolate Research Centre (PPKKI), Jember, Indonesia			
Description: Internship/Work Practice at PPKKI is a student activity in collecting and identifying pest organisms and diseases of coffee and/or cocoa plants, determining the lethal dose of pests and diseases of coffee and/or cocoa plants, analyzing environmental influences on the morphological characteristics of coffee and/or cocoa plants, breeding coffee and/or cocoa plants vegetatively including in vitro, isolate and identify microbes in post-harvest products of coffee and/or cocoa plants, fermentation of coffee and/or cocoa fruits, and other activities determined by PPKKI.			
Internship Conversion Courses			
No	Code	Course Name	Work Load
1	MAB 1401	Mycology	2 credits/3.02 ECTS
2	MAB 1507	Food Microbiology	2 credits/3.02 ECTS
3	MAB 1607	Industrial Microbiology	2 credits/3.02 ECTS



4	MAB 1442	Microbiology Analysis Techniques	2 credits/3.02 ECTS
5	MAB 1645	Plant Tissue Culture	2 credits/3.02 ECTS
6	MAB 1612	Plant Ecophysiology	2 credits/3.02 ECTS
7	MAB 1639	Phytopatology	3 credits/4.53 ECTS
8	MAB 1668	Plant Cultivation Technique	2 credits/3.02 ECTS
9	MAB 1515	Parasitology	2 credits/3.02 ECTS
11	MAB 1614	Entomology	2 credits/3.02 ECTS
12	MAB 1646	Biological Control	2 credits/3.02 ECTS
13	MAB 1006	Research Methodology	2 credits/3.02 ECTS

2. Meru Betiri National Park (TNMB), Jember, Indonesia

Description: Internship / Work Practice at TNMB is a student activity in collecting, describing, and identifying plants constituting tropical forest ecosystems and coastal ecosystem biota, vegetation analysis and ecological value of natural resources of tropical and coastal forest ecosystems, determining the diversity of invasive plant species, birds and primates, and biota of coastal areas and tropical forests, able to assess the quality of environmental biology of tropical and coastal forest ecosystems, and able to determine the management model of tropical forest ecosystems for ecotourism purposes, and other activities assigned by the TNMB.

Internship Conversion Courses

No	Code	Course Name	Work Load
1	MAB 1501	Biogeography	2 credits/3.02 ECTS
2	MAB 1517	Ecotourism	2 credits/3.02 ECTS
3	MAB 1518	Valuation of Biological Resources	2 credits/3.02 ECTS
4	MAB 1519	Environmental Biomonitoring	2 credits/3.02 ECTS
5	MAB 1602	Tropical Forest Ecology	2 credits/3.02 ECTS
6	MAB 1604	Mangrove Ecology	2 credits/3.02 ECTS
7	MAB 1619	Bioinvasion Ecology	2 credits/3.02 ECTS
8	MAB 1621	Coastal Area Management	2 credits/3.02 ECTS
9	MAB 1627	Wildlife Management	2 credits/3.02 ECTS
10	MAB 1612	Plant Ecophysiology	2 credits/3.02 ECTS



11	MAB 1006	Research Methodology	2 credits/3.02 ECTS
12	MAU 1008	Community Service Training	3 credits/4.53 ECTS

3. Research Institute for Citrus and Subtropical Fruit (Balitjestro), Batu, Indonesia

Description: Internship/Work Practice in Balitjestro is an activity of students collecting and identifying pest organisms and diseases of citrus plants and/or subtropical fruits, determining the lethal dose of pests and diseases of citrus plants and/or subtropical fruits, analyzing environmental influences on the morphological characteristics of citrus plants and/or subtropical fruits, breeding citrus plants and/or subtropical fruits vegetatively including in vitro, isolate and identify microbes in post-harvest products of citrus and/or subtropical fruit crops, the use of microbes in the processing of citrus and subtropical fruits, as well as other activities determined by Balitjestro.

Internship conversion courses are the same as internship conversion courses at PPKKI.

c. Internships / Work Practices of the Ministry of Education, Culture, Research, and Technology (Kemendikbud Ristekdikti)

Internships/Work Practices of the Kemendikbud Ristekdikti in accordance with the field of biological sciences are those organized by the National Research and Innovation Agency (BRIN). Students create an account at the Science E-Service (ELSA) in <https://elsa.lipi.go.id>, then students fill out a google form issued by LP3M University of Jember for then the BRIN internship PIC will enter the student's name at ELSA. Students register at ELSA by completing the existing fields. Students who are accepted then do KRS on the ILIC menu at Sister. Courses that can be converted with internships carried out at BRIN are shown in Table 14.

Table 14. Description and convertible courses from an internship at BRIN

1. Research Center for Plant Conservation and Botanical Garden (Purwodadi Botanical Garden)			
a. Internship / Research Work Practice			
Description: Internship / Research Work Practice The Plant Conservation Research Center and Botanical Garden (Purwodadi Botanical Garden) is a student activity in collecting plant samples from their habitat, describing and identifying collected plant specimens, making preparations for plant organ preservation, plant propagation in vitro, analyzing tree health, analyzing data and interpreting the results of data analysis, communicate the results of data analysis as well as other activities determined by the partner.			
Courses for internship conversion			
No.	Code	Course Name	Work Load
1	MAB 1510	Ethnobotany	2 credits/3.02 ECTS
2	MAB 1511	Ornamental Plant	2 credits/3.02 ECTS



4	MAB 1518	Valuation of Biological Resources	2 credits/3.02 ECTS
5	MAB 1523	Natural Medicine	2 credits/3.02 ECTS
6	MAB 1602	Tropical Forest Ecology	2 credits/3.02 ECTS
7	MAB 1612	Plant Ecophysiology	2 credits/3.02 ECTS
8	MAB 1620	Phytoremediation	2 credits/3.02 ECTS
9	MAB 1645	Plant Tissue Culture	2 credits/3.02 ECTS
10	MAB 1665	Higher Plant Taxonomy	2 credits/3.02 ECTS
11	MAB 1667	Pteridophyte	2 credits/3.02 ECTS
12	MAB 1006	Research Metodology	2 credits/3.02 ECTS
<p>b. Internship / Non-Research Work Practice Description: Students carry out scientific collection management activities whose activities include collection registration, breeding and plant maintenance. Plant registration activities include updating the collection database by means of garden inspections. Breeding activities include seedling rearing, potting, changing media, recording seedlings and maintenance activities include planting in the garden, caring for collections, recording flowering and fruiting.</p>			
<p>Courses for internship conversion</p>			
No	Code	Course Name	Work Load
1	MAB 1666	Biological Collection Management	4 credits/ 6.04 ECTS
2	MAB 1667	Pteridophyte	2 credits/3.02 ECTS
3	MAB 1515	Parasitology	2 credits/3.02 ECTS
4	MAB 1508	Phytopatology	3 credits/4.53 ECTS
5	MAB 1612	Plant Ecophysiology	2 credits/3.02 ECTS
6	MAB 1639	Plant Cultivation Technique	2 credits/3.02 ECTS
7	MAB 1665	Higher Plant Taxonomy	2 credits/3.02 ECTS
8	MAB 1511	Ornamental Plant	2 credits/3.02 ECTS
9	MAB 1006	Research Methodology	2 credits/3.02 ECTS
<p>2. Directorate of Scientific Collection, Zoological Division, Biological Research Centre, BRIN</p>			
<p>Internship / Non-research Work Practice</p>			



Description: Students carry out scientific collection management activities whose activities include the registration of collections, collections and maintenance of collections. The registration activities of animal collections include updating the collection database. Collection activities include collecting specimens from their habitat, identifying, naming and numbering, and preserving. Maintenance activities include, among others, replacing the substrate (for wet preservation), removing dirt and mold.

Courses for internship conversion

No.	Code	Course Name	Work Load
1	MAB 1657	Malacology	2 credits/3.02 ECTS
2	MAB 1654	Ornithology	3 credits/4.53 ECTS
4	MAB 1656	Mammalogy	2 credits/3.02 ECTS
5	MAB 1659	Carsinology	2 credits/3.02 ECTS
6	MAB 1658	Herpetology	2 credits/3.02 ECTS
7	MAB 1655	Ichthyology	2 credits/3.02 ECTS
8	MAB 1614	Entomology	2 credits/3.02 ECTS
9	MAB 1627	Wildlife Management	2 credits/3.02 ECTS
10	MAB 1006	Research Methodology	2 credits/3.02 ECTS

3. Limnology Research Centre, BRIN

Description: Students during the internship will conduct sampling activities of plankton, benthic diatoms, pollen in sediments at the bottom of reservoirs, store, analyze samples, cultivate inland aquatic economic biota, assess the quality of inland aquatic ecosystems, improve the quality of the inland aquatic environment with phytoremediation technology, determine past water quality based on diatom and pollen data.

Courses for internship conversion

No.	Code	Course Name	Work Load
1	MAB 1660	Phycology	3 credits/4.53 ECTS
2	MAB 1661	Limnology	3 credits/4.53 ECTS
3	MAB 1662	Planktonology	3 credits/4.53 ECTS
4	MAB 1663	Inland Water Biological Resources Engineering	3 credits/4.53 ECTS
5	MAB 1664	Palinology	2 credits/3.02 ECTS



6	MAB 1519	Environmental Biomonitoring	2 credits/3.02 ECTS
7	MAB 1620	Phytoremediation	2 credits/3.02 ECTS
8	MAB 1006	Research Methodology	2 credits/3.02 ECTS

4. Genetic Engineering Research Centre, BRIN

Description: Extraction and radiation of seeds of horticultural crops, planting of irradiated seeds, LD test of 50% of irradiated seeds, recording of the morphological structure of sprouted seeds, seeding of seeds that have sprouted, drought test of plants, cytological observation of drought-resistant plants and DNA analysis.

Courses for internship conversion

No.	Code	Course Name	Work Load
1	MAB 162	Plant Biotechnology	3 credits/4.53 ECTS
2	MAB 1611	Phytohormon	2 credits/3.02 ECTS
3	MAB 1624	Moleculer Genetic	2 credits/3.02 ECTS
4	MAB 1642	Enzyme Technology	2 credits/3.02 ECTS
5	MAB 1612	Plant Ecophysiology	2 credits/3.02 ECTS
6	MAB 1625	Population Genetic	2 credits/3.02 ECTS
7	MAB 1521	Industrial Biotechnology	2 credits/3.02 ECTS
8	MAB 1639	Phytopatology	2 credits/3.02 ECTS
9	MAB 1006	Research Methodology	2 credits/3.02 ECTS



10.4 Teaching Assistance in Education Units

a. Objectives

Increasing understanding of biological sciences and other sciences for students through becoming teachers in basic education units and helping to improve the equitable distribution of the quality of education, as well as the relevance of primary and secondary education to higher education and the development of the times.

b. Teaching Assistance in the Education Unit of the Kemendikbudristekdikti

Teaching Assistance in the Education Unit organized by the Kemendikbudristekdikti is the Teaching Campus. Students who are interested in participating in this program register on the <https://kampusmerdeka.kemdikbud.go.id> page. Students who are accepted then do KRS on the MBKM menu at Sister.

Table 15. Descriptions and courses that can be validated at BKP Teaching Assistance in the Education Unit

Description: Teaching Assistance in the Education Unit is a student activity in communicating with the principal to get assignments for one semester, communicating with teachers who will be assisted in teaching for predetermined subjects, compiling lesson plans, preparing learning media, teaching, conducting exams, guiding students in extracurricular activities, making reports on activities that have been carried out and other activities that have been carried out assigned by the school.			
Courses for teaching assistance conversion			
No.	Code	Course Name	Work Load
1	MAB 1401	Mycology	2 credits/3.02 ECTS
2	MAB 1510	Ethnobotany	2 credits/3.02 ECTS
3	MAB 1511	Ornamental Plant	2 credits/3.02 ECTS
4	MAB 1513	Bryologi	2 credits/3.02 ECTS
5	MAB 1523	Natural Medicine	2 credits/3.02 ECTS
6	MAB 1602	Tropical Forest Ecology	2 credits/3.02 ECTS
7	MAB 1604	Mangrove Ecology	2 credits/3.02 ECTS
8	MAB 1607	Industrial Microbiology	2 credits/3.02 ECTS
9	MAB 1614	Entomology	2 credits/3.02 ECTS
10	MAB 1621	Coastal Area Management	2 credits/3.02 ECTS
11	UMU 1301	Basic Concept of Pedagogy	2 credits/3.02 ECTS



12	UMU 1302	Information and Communication Technology-Based Learning	2 credits/3.02 ECTS
13	UMU 1303	Inovation and Creativity	2 credits/3.02 ECTS
14	UMU 1304	Numeration and Literation	2 credits/3.02 ECTS
15	UMU 1306	Communication and Ethics	2 credits/3.02 ECTS
16	UMU 1307	Learning Inovation	2 credits/3.02 ECTS
17	MAU 1008	Community Services Training	3 credits/4.53 ECTS

10.5 Research

a. Objectives

To improve the competence and quality of research of students who get direct guidance by researchers in research institutions / study centers, strengthen the talent pool of researchers topically, improve the ecosystem and quality of research in Indonesian laboratories and research institutions by providing research resources and regeneration of researchers from an early age.

b. Research Partnership

Students can take part in BKP research / research organized by study programs at partner institutions such as PPKKI, TNMB, and Balitjestro. The registration stage is the same as registering for an internship/work practice. The activities carried out by students are to help research researchers at the institution or students conduct independent research guided by researchers at the institution. The topic under study is adjusted to that carried out in the institution. The research activities are converted to courses whose material is in accordance with the topic under study.

c. Research of Kemendikbud Ristekdikti

Students can conduct Research at the National Research and Innovation Agency (BRIN). The registration process until the programming of converted courses and regular courses at semester plan study is the same as registering for an internship held by the Kemendikbudristekdikti. The activities carried out by students are to help researchers conduct research or students conduct independent research by being guided by researchers at the institution where the research / research is located. The topic under study is adapted to what can and is commonly done in such institutions. The research activities can be converted with courses whose material is in accordance with the topic under study.

10.6 Humanitarian Project

a. Objectives

Preparing superior students who uphold human values in carrying out tasks based on religion, morals, and ethics and training students to have social sensitivity to explore and dive into existing problems and contribute to providing solutions according to their respective interests and expertise.



b. Humanitarian Project of the Kemendikbudristekdikti

The Humanitarian Project organized by the Kemendikbud Ristekdikti is a young warrior initiated by the Ministry of Social Affairs. The Young Warrior Program focuses on developing social assistance programs, empowering the poor and the elderly, healthy lifestyles and cleanliness of the environment and facilities for the public interest. Students work on poverty and social problem management projects and data improvement to create poverty alleviation program projects that were previously refocused and evaluated.

The activity, which lasted for one semester, was equated to a load of 20 credits. The course that can be converted into a Young Warrior is a course of the University of Jember (Table 16). The registration process until the programming of converted courses and regular courses at study plan sheet is the same as registering for an internship held by the Kemendikbud Ristekdikti.

Table 16. Description and convertible courses on Humanitarian Projects

Description: The Humanitarian Project is an activity of students descending directly into areas that need assistance, collaborating in the Ministry of Social Affairs to support their programs, designing and executing relevant social programs for the area, and designing digital campaigns to support social programs.			
Courses of humanitarian project conversion			
No.	Code	Course Name	Work Load
1	UMU 1701	Humanitarian Project Management	2 credits/3.02 ECTS
2	UMU 1702	Social Entrepreneurship	2 credits/3.02 ECTS
3	UMU 1703	Social Project Management	2 credits/3.02 ECTS
4	UMU 1704	Risk Mitigation	2 credits/3.02 ECTS
5	UMU 1705	Business Communication	3 credits/4.53 ECTS
6	UMU 1706	Community Empowerment	3 credits/4.53 ECTS
7	UMU 1707	Professional Ethics	3 credits/4.53 ECTS
8	UMU 1708	Social Welfare	3 credits/4.53 ECTS

10.7 Entrepreneurship

a. Objectives

Foster the interest of entrepreneurial students to develop their business earlier and be guided and able to reduce intellectual unemployment from undergraduates.

b. Stages of the Entrepreneurial Program

The supported field of entrepreneurship is based on tropical biological resources. Students independently or in groups with the guidance of mentors or entrepreneurial lecturers compile



entrepreneurial proposals. The study program assesses proposals, course recognition, and appoints field supervisor and entrepreneurial expert mentors who have succeeded in entrepreneurship. Students carry out entrepreneurial activities according to proposals prepared under the guidance of DPL and mentors interspersed with attending training related to entrepreneurship. Towards the end of the semester, students compile a report and present it which is assessed by the assessment team. The Entrepreneurial Program for one semester is converted with 20 credits of courses (Table 17).

Table 17. Description and list of convertible courses in the Entrepreneurial Program

No.	Code	Course Name	Work Load	Course of Study Program
1	PNB 1507	Bussines Law and Ethics	2 credits/3.02 ECTS	Agribusiness
2	PNB 1413	Agribusiness Marketing and Consumer Behavior	3 credits/4.53 ECTS	Agribusiness
3	PNB 1416	Business Practices and Entrepreneurship	2 credits/3.02 ECTS	Agribusiness
4	MAB 1401	Mycology	2 credits/3.02 ECTS	Biology
5	MAB 1510	Ethnobotany	2 credits/3.02 ECTS	Biology
6	MAB 1511	Ornamental Plant	2 credits/3.02 ECTS	Biology
7	MAB 1523	Natural Medicine	2 credits/3.02 ECTS	Biology
8	MAB 1607	Industrial Microbiology	2 credits/3.02 ECTS	Biology
9	MAB 1613	Orchidology	2 credits/3.02 ECTS	Biology
10	MAB 1517	Ecotourism	2 credits/3.02 ECTS	Biology



10.8 Independent Studies / Projects

a. Objectives

Realizing student ideas in developing innovative products, organizing research and development (R&D) based education, and improving student achievement in national and international events.

b. Independent Study of the Faculty of Mathematics and Natural Sciences University of Jember

Independent Study can be followed by students with the following stages. Students compile proposals independently or in groups, then the proposals are submitted to the faculty's independent study committee, proposals are assessed by the faculty's independent study assessment team, students can carry out independent studies if the proposal is declared feasible to implement. Students carry out independent study activities under the guidance of field supervisor who have guided students to compile proposals with or without partners from the beginning. Furthermore, students program courses at the Sister, University of Jember. At the end of the activity, students in addition to producing products according to the proposal also compile a report that will be used as one of the basis for the assessment. Students can see the Guidelines for the Implementation of the Independent Learning Program-Independent Campus in the Form of Independent Study Learning Activities FMIPA 2021/2022.

c. Independent Studies/Projects of the Kemendikbud Ristekdikti

Students can take part in one of the competition grants organized by the Ministry of Education and Culture's Achievement Center such as the Student Creativity Program (PKM), holistic village development and empowerment program (PHP2D), and the Indonesian Student Business Competition (KBMI) by compiling proposals in groups and then uploading the proposals on the predetermined portal. If the proposal is accepted and funded, then in the next semester students can program independent studies/projects. Independent study activities can be converted into courses with weights in accordance with the provisions of the ministry. At the end of the activity, students compile an independent study activity report and present it. If in the proposal there is a promised outcome, for example a product, the student must fulfill the promise.

10.9 Building Villages / Thematic Community Services Training

a. Objectives

Providing opportunities for students to take advantage of the science, technology, and skills they have in collaboration with many stakeholders in the field and help accelerate development in rural areas together with the Ministry of Villages, Development of Disadvantaged Areas and Transmigration.

b. Location

The implementation of building vilages is carried out in very underdeveloped, underdeveloped and developing villages, whose human resources do not yet have the ability to plan development with such large funding facilities. The implementation of village building program is expected to increase the effectiveness of the use of village funds to drive economic growth by involving those who can become human resources that further empower village funds. The implementation of building villages for one semester can be converted into courses with a weight of 20 credits (Table 18).



Table 18. Description, CPL and Converted courses on Village Building activities

No.	Code	Course Name	Work Load
1	MAB 1510	Ethnobotany	2 credits/3.02 ECTS
2	MAB 1511	Ornamental Plant	2 credits/3.02 ECTS
3	MAB 1513	Bryology	2 credits/3.02 ECTS
4	MAB 1519	Environmental Biomonitoring	2 credits/3.02 ECTS
5	MAB 1523	Natural Medicine	2 credits/3.02 ECTS
6	MAB 1602	Tropical Forest Ecology	2 credits/3.02 ECTS
7	MAB 1604	Mangrove Ecology	2 credits/3.02 ECTS
8	MAB 1607	Industrial Microbiology	2 credits/3.02 ECTS
9	MAB 1614	Entomology	2 credits/3.02 ECTS
10	MAB 1621	Coastal Area Management	2 credits/3.02 ECTS
11	MAB 1620	Phytoremediation	2 credits/3.02 ECTS
12	MAB 1006	Research Methodology	2 credits/3.02 ECTS
13	MAU 1008	Community Services Training	3 credits/4.53 ECTS

10.10 Principles in Converting and Calculating Grades and Credits in ICIL Programs

a. Student Exchange

The final grade for student exchange is determined by the study program where students are enrolled. The grade is sent to the Bachelor in Biology Study Program and entered by the operator into the student's *KHS* and deposited into Higher Education Database (*PDDIKTI*) to be reported as the grade in the student exchange.

b. Internship, Teaching Assistance in Education Unit, Research, Independent Study, Humanity Project, Entrepreneurship, and Village Development /Thematic Community Services Training

The final grades for courses integrated into Internship, Teaching Assistance in Education Unit, Research, Independent Study, Humanity Project, Entrepreneurship, and Village Development/Thematic Community Services Training are determined based on the suitability of PLOs and required time for achieving each PLO. Based on the assessments by supervisors and mentoring lecturers, the grades are then equated to the courses associated with the seven activities above mentioned. Equivalent scores will be entered



into the student's study report sheet and sent to higher education database (*PDDIKTI*) to be reported as course grades achieved through ILIC programs.

Activities of ILIC program with 20 credits are granted if student has completed related learning activities for 5.6 months, as elaborated below:

1 credit = 170 minutes x 16 weeks = 2.720 minutes = 45 hours

1 day of learning activities = 8 hours

20 credits (learning activities) = 20 credits x 45 hours = 900/8 hours = 112,5 days

112,5 days/20 working days in a month = 5,6 months

PLOs involving knowledge, attitudes, and specific and general skills are obtained from the seven activities of ILIC program. The assessment is carried out by supervisors and mentoring lecturers who monitor and evaluate students' progress.



10. The Management and Mechanism of Curriculum Implementation

Guaranteeing the implementation of the curriculum begins through the preparation of curriculum implementation standards which are the basis for service and minimum achievements that must be met in the implementation of the curriculum. This standard is then set by the Head of Study Program (Koprodi) to be then run.

11.1 Internal Monitoring of Learning Implementation

Periodically internal evaluation is carried out by the Koprodi with quality assurance unit of Bachelor in Biology Study Program (UPM) on the implementation of curriculum implementation. Evaluation is carried out starting from the process of planning, implementing and assessing. At the beginning of the lecture, Koprodi with UPM will control the completeness of the learning tools for each course uploaded on MMP SISTER. If the monitoring results find that there are courses that have not completed their learning tools, UPM with the knowledge of the Koprodi will remind the coordinator of the course to upload it immediately.

In the first third of the time for the implementation of learning, the Koprodi will monitor the implementation of learning in each course. If the monitoring results there are courses that have not held lectures or have received five meetings, the Koprodi will give a reprimand to the course coordinator to immediately give lectures as scheduled. This activity will be repeated at two-thirds of the time of learning.

11.2 External Monitoring

The implementation of external monitoring learning is carried out by LP3M Jember University by involving quality assurance group of FMIPA (GPM) and UPM. External monitoring is carried out at the beginning of the lecture to control the completeness of the learning tools of each course. Monitoring is also carried out towards the end of the lecture implementation to control the suitability of the learning implementation with the learning plan prepared before the lecture takes place. The conformity that is monitored includes, among others, the suitability of learning materials with PLO entrusted to courses, learning methods, assignments, and the grading system. After the lecture is completed, a determination of PLO achievement is carried out based on the value data of each course that has been filled in by the course coordinator. The coordinator. The implementation of external monitoring is carried out online through a University of Jember quality assurance system, namely SIJAMU.

The results of the evaluation of curriculum implementation both internally and externally become material for study programs to correct deficiencies and improve those that have



been assessed as good. The results of the curriculum evaluation will be reported by UPM at the end of the semester meeting.

