



ACADEMIC GUIDELINE BACHELOR IN BIOLOGY

**MERDEKA BELAJAR KAMPUS
MERDEKA (MBKM)
CURRICULUM
2022 - 2024**

**BIOLOGY STUDY PROGRAM
FACULTY OF MATHEMATICS
AND NATURAL SCIENCES**

**PADJADJARAN UNIVERSITY
2022**

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PREFACE

The Curriculum Document in 2022 for the Independent Learning Independent Campus or *Merdeka belajar Kampus Merdeka* (MBKM) is a curriculum document that has undergone refinement and synergy with Government Regulation Number 3 of 2020 concerning 2020 concerning National Higher Education Standards, related to the Independent Learning in Campus. The evaluation process for the 2018 Curriculum is based on various inputs and the transformation process into the MBKM-2020 Curriculum by considering developments in the needs of stakeholders and the world of work.

This document contains the vision and mission of the 2020-2024 Bachelor Program of Biology which has been aligned with the Unpad Vision. Provisions regarding the implementation of academic activities are written briefly and completely, containing components or elements related to the academic field, including a complete description of all service courses, graduate competencies, and the learning process, including the assessment process. Information on faculty resource facilities and governance management, information on student activities and partnerships. This article aims to be a source of information for students registered in the 2020–2024 FMIPA Unpad Biology Study Program.

Bandung, 15 July 2022
Head of Study Program
Bachelor of Biology

CHAPTER 1: INTRODUCTION

Biology acts as a basic science which is expected to be able to reveal natural phenomena. In addition to understanding the concepts and basics of biology, biology graduates are expected to be able to utilize biodiversity and biological capabilities and increase productivity to fulfil sustainable human welfare. Current developments require the development of the field of biology to adapt to the concepts of understanding and competence of scientists and biotechnologists.

The Ministry of Education and Culture assisted the College achieve those aims through the *Merdeka Belajar Kampus Merdeka* (MBKM) policy in order to realize the national objectives of education as a trust of Law No. 12 Year 2012. According to the Procurator No. 3 Year 2020 on the National Standards of Higher Education, there are four policy trusts related to *MBKM*, which include: (1) the facilitation of the opening of new study programs; (2) changes in the college accreditation system; (3) the transformation of the college into a legal body; and (4) the right to study two semesters outside of the study program. The policy requires the College to develop and implement the learning process so that students have optimal access to it.

The curriculum was revised (improved) in order to change *MBKM* program while taking into consideration the peculiarities of biology in a very broad setting. Prospective biologists will face problems in developing creative thinking in the sectors of food, health, energy availability, and sustainable environmental quality management in order to survive and prosper in the workplace during the next ten years. Furthermore, the demands of the Technology 4.0 revolution and the progress of digitalization in practically all systems, as well as the learning process, have a dynamic that is in step with scientific research and commercial needs. The market need for biological research is also changing in response to current conditions. The current job market necessitates the acquisition of soft skills as well.

The profundity of this research is required for its application to promote the increase of potential in the Study Program of Biology three melting areas. Workplace expects a Bachelor of Biology graduate with a complex personality who possesses soft skill, a degree of critical and sophisticated thinking, and technical abilities in the millennium period. The fundamental sciences will be provided extensively, with emphasis on the strategy of developing biological science fundamental ideas through non-curricular and extracurricular activities.

CHAPTER 2: PROFILE OF BACHELOR PROGRAM IN BIOLOGY

2.1 History

Padjadjaran University was founded on September 18, 1957 (based on PP No.37 of 1957). A year later, the next cycle of Prodi Biology was officialized as the Biological Science Department in the Faculty of Natural Sciences (FIPIA) by President Soekarno, with his speech entitled “The Development of Science and Natural Science from Century to Century”. Ten years later, on the basis of the decision of the Director General of the College No. 114 In 1967, the establishment of the Institute of Natural Studies (LIPA) with the Director of Prof. Dr. Sasongko Sodo Adisewojo, together with the founding of the Laboratory of Chemical, Physical and Biological Sciences as one of the projects in the framework of partnership with the Government of the Netherlands. In the same year, the name was changed from the Faculty of Science and Natural Science (FIPIA) to the faculty of natural sciences and natural knowledge. (FIPPA). Since 1982 until now, the management of Biology is under the umbrella of the Faculty of Mathematics and Natural Sciences. (FMIPA). The recognition of the name of the Biology Studies Programme was established on July 11, 1996 on the basis of the Decision of the Directorate: No. 217/DIKTI/Kep/1996.

2.2 Accreditation Status

Prodi Biology has obtained accredited status A (very good) three times in a row, based on the National-Higher Education Accreditation Body (BAN-PT):

- SK BAN-PT No. 018/BAN/PT/Ak-X/S1/XI/2006, Biology Accredited A
- SK Ban-PT no. 025/BAN-PT/AK-XV/S1/VIII/2012, Biology accredited A
- Sk BAN-P No. 4734/SK/BAN-P/Akred/S/XII/2017, Biology Accredited A.
- The bachelor's level competence refers to the KOBI Association (Indonesian Biology Consortium). Based on the Lembaga Akreditasi Mandiri Sains Alam dan Ilmu Formasi (LAMSAMA), the accreditation status of the BPB is EXCELLENCE or “UNGGUL” Nomor 012/SK/LAMSAMA/Akred/S/XII/2022.

2.3 Vision, Mission, Destination

Vision

Achieving an international standard Bachelor of Biology Studies Program, excellence in studies in the fields of environment and biological resources, and impact on the society

Mision

As the Vision of Prodi Biology 2020 – 2024, the mandates to be carried out are as follows:

1. Implementing quality biology learning to produce graduates with competitive biology competence;

2. Supporting the realization of academic excellence by conducting and developing basic and applied science research in the area of biology in particular in the areas of the environment and bio-resources in order to obtain national and international recognition;
3. Improving the contribution of faculty and students in carrying out devotion to the societies in biological fields that are beneficial to those in the West Java and Indonesian societies;
4. Implements a system of accountability with the Transparent Mutualization Guarantee System;
5. Improve and enhance partnerships or cooperation with various foreign interests both in the country and in the international programmes to continue learning and internationalization.

Objectives

As the Vision of Prodi Biology 2020-2024, strategic objectives are set to be achieved as follows:

1. Realization of a quality learning system in the field of biology that can respond to the needs of the world of work;
2. Achieving a characteristic and competitive national and international graduates;
3. Achievement of the results of research and expertise in biological fields that are environmentally conscious and acknowledged nationally and internationally;
4. Creation of increased involvement of faculty and students in community dedication activities in West Java and Indonesia;
5. Implementation of the system of professional academic service governance;
6. Improvement of cooperation in the country and abroad as a means of realization of independent learning and curriculum development towards internationalization.

CHAPTER 3: CURRICULUM STANDARD

3.1 Graduate Profile

A graduate profile is a characteristic or role that can be performed by graduates in a particular field of expertise or field of work after completing their studies a particular field of expertise or field of work after completing their studies. The Program Learning Outcome (PLO) is a general statement that describes what graduates are expected to achieve within a few years after graduation. PEOs are based on the needs and predictions of future capabilities.

Program Learning Outcomes (PLO) Bachelor Program in Biology

PLO-1	Produce graduates who are ready to learn throughout their lives through further studies, research, and professional activities at the national or international level.
PLO-2	Produce graduates who have the ability to use knowledge and skills in the field of biology, including the exploration and application of biological and environmental resources, as well as other relevant fields.
PLO-3	Produce graduates who can apply biology with sustainable and environmentally friendly concepts and understand professional responsibilities in society.

3.2 Intended Learning Outcomes (ILO)

Intended Learning Outcomes (ILO) consist of from the aspects of Attitude, Knowledge, General Skills and Specific Skills. The following is the CPL from the Biology study program

Intended Learning Outcomes (ILO) Bachelor Program in Biology

ILO-1	Able to develop a sense of togetherness, character, and contribute to the improvement of community life, nation, state, and the progress of civilization that is sustainable, based on values, norms, and academic ethics oriented towards RESPECT (responsibility, excellence, scientific rigor, professionalism, encouraging, creativity, trust).
ILO-2	Mastery of Biology concepts and methods and their application to support a profession in Biology.
ILO-3	Mastery of the principles of Biology in exploring and applying biological and environmental resources

ILO-4	Able to learn multidisciplinary biological applications with the latest technology while developing strong character, leadership, and entrepreneurship.
ILO-5	Capable of applying logical, critical, systematic, and innovative thinking in the context of developing or implementing biological knowledge.
ILO-6	Able to make informed decisions based on data analysis and information in the context of solving biological problems.
ILO-7	Able to evaluate work results both independently and in groups
ILO-8	Able to develop oneself by strengthening character, competence, data literacy, technological literacy, human literacy, and 21st-century soft skills that foster Higher Order Thinking Skills (HOTS).
ILO-9	Able to present alternative solutions to solve problems related to the sustainable management of biological and environmental resources through the application of relevant biological knowledge, methods, and technology as a basis for making informed decisions.
ILO-10	Able to apply Biology knowledge in daily life for the benefit of society.
ILO-11	Able to manage biological and environmental resources in a specific context.
ILO-12	Able to assess the needs of the community, taking into account local potential advantages, and implement biological knowledge for the benefit of society and industry.

3.3 Curriculum Structure of the Bachelor Program of Biology

The Bachelor curriculum design in Biology is structured as a learning program for a maximum study period of 8 (eight) semesters or 4 years of active period. The target material content in the curriculum prioritizes mastery of basic biological concepts, application to areas of specialization, and development of soft skills by studying outside campus. The curriculum design is adapted to the mindset (paradigm) that learning starts from mastering basic and simple concepts to the complexity of the synergy of knowledge in one biological discipline (Figure 3.1). Systematic competencies are traced through this curriculum structure in the form of teaching materials and courses which are distributed in stages each semester.

Semester 1:

Basic knowledge that supports mastery of Biology concepts in the following years: courses that characterize national and university graduates such as Religion, Pancasila, Civic Education, Indonesian Language, English, Exercise Creativity and Entrepreneurship; Apart from that, it is also equipped with Basic Biology Practicum of Basic Biology, Bioprospection, Biomathematics and Computation.

Semester 2-4:

Basic and advanced biology includes material on ecology, structure and physiology of plants, and animal biology, microbiology, biodiversity which is complemented by

practical courses. and knowledge of statistical data processing skills, literacy and scientific writing techniques, biophysics instrumentation, biotechnology and bioinformatics.

Semester 5:

Scientific skill that leads to biological applications with cluster courses in the areas of bioscience, environmental biology, and applied microbiology which are equipped with analytical biochemistry, bio management, and research methodology.

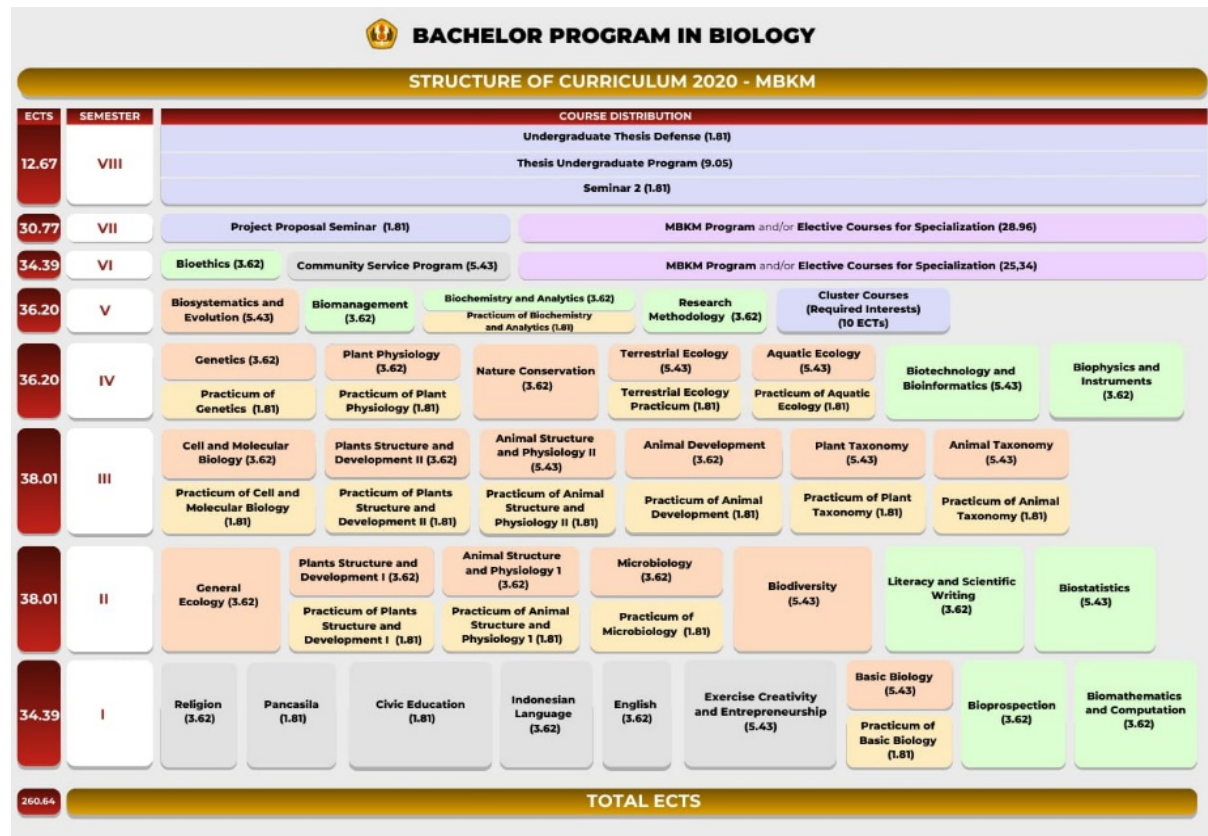


Figure 3.1 Structure of Distribution Courses Per Semesters of Bachelor Program of Biology

Semester 6 -7:

Off-campus applied competency development program learning with a choice of specializations such as researchers, entrepreneurs and consultants, or others; with the aim of utilizing the understanding and skills possessed to hone critical aspects of thinking, creativity, communication and collaboration in a multidisciplinary manner.

Semester 8:

Competency for solving biology problems in the form of a final project by integrating basic, applied and multidisciplinary scientific aspects.

3.4 List of Biology Undergraduate Study Program Courses and Syllabus

1st Semester

No.	Course Code	Course	Credit (s)	ECTS	ILO CODE
1.	UNX0H10-2003	Religion	2	3.62	ILO 1, ILO 8
2.	UNX01-007	Pancasila	1	1.81	ILO 1, ILO 8
3.	UNX01-008	Civic Education	1	1.81	ILO 1, ILO 8
4.	UNX01-004	Indonesian Language	2	3.62	ILO 1, ILO 8
5.	UNX01-005	English	2	3.62	ILO 1, ILO 8
6.	UNX10-1309	Exercise Creativity and Entrepreneurship	3	5.43	ILO 1, ILO6, ILO 8
7.	D10D-1001	Basic Biology	3	5.43	ILO2, ILO7, ILO8
8.	D10D-1002	Practicum of Basic Biology	1	1.81	ILO1, ILO2, ILO3, ILO6
9.	D10D-1003	Bioprospection	2	3.62	ILO4, ILO5
10.	D10D-1004	Biomathematics and Computation	2	3.62	ILO4, ILO5, ILO6
Sum			19	34.39	

2nd Semester

No.	Course Code	Course	Credit (s)	ECTS	ILO
1.	D10D-2001	General Ecology	2	3.62	ILO2, ILO8
2.	D10D-2002	Plants Structure and Development I	2	3.62	ILO2, ILO8
3.	D10D-2003	Practicum of Plants Structure and Development I	1	1.81	ILO1, ILO2, ILO3, ILO6,
4.	D10D-2004	Animals Structure and Physiology I	2	3.62	ILO2, ILO8
5.	D10D-2005	Practicum of Animals Structure and Physiology I	1	1.81	ILO1, ILO2, ILO3, ILO6
6.	D10D-2006	Microbiology	3	5.43	ILO2, ILO7, ILO8
7.	D10D-2007	Practicum of Microbiology	1	1.81	ILO1, ILO2, ILO3, ILO6
8.	D10D-2008	Biodiversity	3	5.43	ILO2, ILO7, ILO8
9.	D10D-2009	Literacy and Scientific Writing	2	3.62	ILO5, ILO6, ILO8
10.	D10D-2010	Biostatistics	3	5.43	ILO4, ILO5, ILO6
Sum			20	38.01	

3rd Semester

No.	Course Code	Course	Credit (s)	ETCS	ILO
1.	D10D-3001	Cell and Molecular Biology	2	3.62	ILO2, ILO8
2.	D10D-3002	Practicum of Cell and Molecular Biology	1	1.81	ILO1,ILO2, ILO3, ILO6
3.	D10D-3003	Plants Structure and Development II	2	3.62	ILO2, ILO8

4.	D10D-3004	Practicum of Plants Structure and Development II	1	1.81	ILO1,ILO2, ILO3, ILO6
5.	D10D-3005	Animals Structure and Physiology II	3	5.43	ILO2,ILO7, ILO8
6.	D10D-3006	Practicum of Animals Structure and Physiology II	1	1.81	ILO1,ILO2, ILO3, ILO6
7.	D10D-3007	Animal Development	2	3.62	ILO2, ILO8
8.	D10D-3008	Practicum of Animal Development	1	1.81	ILO1,ILO2, ILO3, ILO6
9.	D10D-3009	Plant Taxonomy	3	5.43	ILO2, ILO7, ILO8
10.	D10D-3010	Practicum of Plant Taxonomy	1	1.81	ILO1,ILO2, ILO3, ILO6
11.	D10D-3011	Animal Taxonomy	3	5.43	ILO2, ILO7, ILO8
12.	D10D-3012	Practicum of Animal Taxonomy	1	1.81	ILO1,ILO2, ILO3, ILO6
Sum			21	38.01	

4th Semester

No.	Course Code	Course	Credit (s)	ECTS	ILO
1.	D10D-4001	Genetics	2	3.62	ILO2, ILO8
2.	D10D-4002	Practicum of Genetics	1	1.81	ILO1,ILO2, ILO3, ILO6
3.	D10D-4003	Plant Physiology	2	3.62	ILO2, ILO8
4.	D10D-4004	Practicum of Plant Physiology	1	1.81	ILO1, ILO2, ILO3, ILO6
5.	D10D-4005	Nature Conservation	2	3.62	ILO2, ILO8
6.	D10D-4006	Terrestrial Ecology	3	5.43	ILO2, ILO7, ILO8
7.	D10D-4007	Practicum of Terrestrial Ecology	1	1.81	ILO1, ILO2, ILO3, ILO6
8.	D10D-4008	Aquatic Ecology	3	5.43	ILO2, ILO7, ILO8
9.	D10D-4009	Practicum Aquatic Ecology	1	1.81	ILO1, ILO2, ILO3, ILO6
10.	D10D-4010	Biotechnology and Bioinformatics	3	5.43	ILO4, ILO5, ILO6
11.	D10D-2011	Biophysics and Instrument	2	3.62	ILO4, ILO6
Sum			21	38.01	

5th Semester

No.	Course Code	Course	Credit (s)	ECTS	LO Code
1.	D10D-5001	Biosystematics and Evolution	3	5.43	ILO2, ILO7, ILO8
2.	D10D-5002	Biomangement	2	3.62	ILO4, ILO5
3.	D10D-5003	Biochemistry and Analytics	2	3.62	ILO4, ILO6
4.	D10D-5004	Practicum of Biochemistry and Analytics	1	1.81	ILO1, ILO2, ILO3, ILO6
5.	D10D-5005	Research Methodology	2	3.62	ILO5, ILO6
6.	D10D-50xx	Compulsory Courses of Interest of Specialization*	10	18.1	ILO4, ILO8, ILO9, ILO10, ILO11
Sum			20	36.20	

5th Semester (Compulsory Courses of Interest of Specialization*)

BIOSCIENCES					
No.	Course Code	Course	Credit (s)	ECTS	ILO
1.	D10D-50601	Bioprospection of Beneficial Plants	2	3.62	ILO4, ILO8, ILO9, ILO10, ILO11
2.	D10D-50602	Digitalization of Biological Objects	2	3.62	ILO4, ILO8, ILO9, ILO10, ILO11
3.	D10D-50603	Animal Biotechnology	2	3.62	ILO4, ILO8, ILO9, ILO10, ILO11
4.	D10D-50604	Plant Biotechnology	2	3.62	ILO4, ILO8, ILO9, ILO10, ILO11
5.	D10D-50605	Field Study	2	3.62	ILO4, ILO8, ILO9, ILO10, ILO11
Sum			10	18.1	
ENVIRONMENTAL OF BIOLOGY					
1.	D10D-50606	Research Methodology of Ecology	4	7.24	ILO4, ILO8, ILO9, ILO10, ILO11
2.	D10D-50607	Tropical Biodiversity	2	3.62	ILO4, ILO8, ILO9, ILO10, ILO11
3.	D10D-50608	Human Ecology	2	3.62	ILO4, ILO8, ILO9, ILO10, ILO11
4.	D10D-50605	Field Study	2	3.62	ILO4, ILO8, ILO9, ILO10, ILO11
Sum			10	18.1	
APPLIED MICROBIOLOGY					
1.	D10D-50609	Environmental Microbiology	4	7.24	ILO4, ILO8, ILO9, ILO10, ILO11
2.	D10D-506010	Industrial and Applied Microbiology	4	7.24	ILO4, ILO8, ILO9, ILO10, ILO11
3.	D10D-50605	Field Study	2	3.62	ILO4, ILO8, ILO9, ILO10, ILO11
Sum			10	18.1	

6th Semester

No.	Course Code	Course	Credit (s)	ECTS	ILO
1.	D10D-6001	Bioethics**	2	3.62	ILO4, ILO5
2.	D10D-6002	Community Service Program**	3	5.43	ILO1, ILO5, ILO6, ILO7, ILO9, ILO12
3.	D10D-XX00	Compulsory Courses in the Field of Specialization***	14	25.34	
		(1) Industrial Internship			ILO1, ILO4, ILO5, ILO6, ILO7, ILO8, ILO9,
		Professional ethics	3	5.43	
		Communication and public speaking	4	7.24	
		Strategy and negotiation	3	5.43	
Creative, Innovative, and Critical Thinking	3	5.43			

	Leadership	3	5.43		
	Adaptation, cooperative and collaboration skills	3	5.43		
	Digital literacy	3	5.43		
	(2) Humanity Program			ILO1, ILO4, ILO5, ILO6, ILO7, ILO8, ILO9, ILO10, ILO12	
	Diversity and Multiculturalism	3	5.43		
	Introduction to community development	3	5.43		
	Talent development	3	5.43		
	Social entrepreneurship	3	5.43		
	Creative, Innovative, and Critical Thinking	3	5.43		
	Complex problem solving	3	5.43		
	Program design	6	10.86		
	Strategy and negotiation	3	5.43		
	Communication and public speaking	4	7.24		
	Emotional and social learning	3	5.43		
	(3) Teaching program				ILO1, ILO2, ILO4, ILO5, ILO7, ILO8, ILO9, ILO11, ILO12
	Basic concepts of pedagogy	4	7.24		
	Classroom management	3	5.43		
	Creative, Innovative, and Critical Thinking	3	5.43		
	Communication and public speaking	4	7.24		
	Information and technology literacy	3	5.43		
	Leadership	3	5.43		
	Emotional and social learning	3	5.43		
	Professional development	3	5.43		
	(4) Entrepreneurship			ILO1, ILO4, ILO5, ILO6, ILO7, ILO8, ILO9, ILO11,	
	Business literacy	3	5.43		
	Financial literacy	3	5.43		
	Information and technology literacy	3	5.43		
	Communication and public speaking	4	7.24		
	Innovation and design development	3	5.43		
	Complex problem solving	3	5.43		
	Project management	3	5.43		
	Social entrepreneurship	3	5.43		
	Leadership	3	5.43		
	Diversity and Multiculturalism	3	5.43		
	(5) Independent Research				ILO1, ILO4, ILO5, ILO6, ILO7, ILO8, ILO9, ILO12
	Creative, Innovative, and Critical Thinking	3	5.43		
	Complex problem solving	3	5.43		
	Creative, Innovative, and Critical Thinking	3	5.43		
	Leadership	3	5.43		
	Program design	6	10.86		
	Adaptation, cooperative and collaboration skills	3	5.43		
	Social entrepreneurship	3	5.43		

	Professional development	3	5.43	
	Decision making	3	5.43	
	Project management	3	5.43	
	Information and technology literacy	3	5.43	
	Work and Professional Ethics	3	5.43	
	Problem Formulation	3	5.43	
	Talent development	3	5.43	
	(6) Thematic of Community Service Program			ILO1, ILO4, ILO5, ILO6, , ILO9, ILO10, ILO12
	Diversity and Multiculturalism	3	5.43	
	Community assets	3	5.43	
	Introduction to community development	3	5.43	
	Community development facilitator	4	7.24	
	Program design	6	10.86	
	Leadership	3	5.43	
	(7) Research Projects in Areas of Interest			ILO1, ILO4, ILO5, ILO7, ILO8, ILO9, ILO11
	Innovation and design development	3	5.43	
	Creative, Innovative, and Critical Thinking	3	5.43	
	Communication and public speaking	4	7.24	
	Information and technology literacy	3	5.43	
	Work and Professional Ethics	3	5.43	
	Adaptation, cooperative and collaboration skills	3	5.43	
	Professional development	3	5.43	
	(8) Student Exchange			ILO1, ILO4, ILO5, ILO6, ILO7, ILO8, ILO12
	This program will be adopted all of subject from target institutions	20	36.2	
Sum		227		

7th Semester

No.	Course Code	Course	Credit (s)	ECTS	ILO
1	D10D-XX00	Compulsory Courses in the Field of Specialization***	16	28.96	ILO1, ILO4, ILO5, ILO6, ILO7, ILO8, ILO9, ILO10, ILO11, ILO12
2.	D10D-5006	Project Proposal Seminar	1	1.81	ILO4, ILO8, ILO9, ILO10, ILO11
Sum			17	30.77	

8th Semester

No.	Course Code	Course	Credit (s)	ECTS	ILO
1.	D10D-8301	Seminar 2	1	1.81	ILO3, ILO4, ILO9
2.	D10D-8302	Thesis of Undergraduate Program	5	9.05	ILO3, ILO4, ILO9

3.	D10D-8303	Undergraduate Thesis Examination	1	1.81	ILO2, ILO3, ILO4, ILO5
Sum			7	12.67	

(*) See Description of Compulsory Course of Interest of Specialization

(**) See Description of MBKM Activities and Conversion into University Courses

(**) See Description of Elective Courses

3.5 Standards for Learning Accession

A. LEARNING PROCESS

The implementation of the learning process in the curriculum in Bachelor Program of Biology is carried out in three patterns:

1. Intra-curricular learning, this learning is a process of delivery of material that can be done face-to-face or with remote learning method (PJJ). Intra-curricular activities with Merdeka Belajar (MB) strategy are the right of students to be able to choose an Experimental Learning program outside the campus, for students who do not take an MB option can run a regular curriculum.
2. Co-curricular learning, this learning should be designed by the lecturers in implementing student activities outside the classroom in a manner assignment that can be carried out independently by students with the accompanying process. The purpose of this non-curricular activity is to deepen the material that has been submitted within the intra-curricular framework. Co-curricular activities can be developed in the form of deepening technical skills with practices or practices, field activities, industrial visits, village visits and so on; or with other activities that can enhance critical thinking such as: assignment to analyse and synthesize various theories, studying new things, giving case studies, mini-research, field lectures, examining scientific journals, or many other forms. In order to enhance future biology insights, institutional partnership identification activities by conducting industrial visits or institutions with complete laboratory facilities, or by inviting national or international sources are strategic steps for the implementation of co-curricular activities.
3. Extracurricular learning, this learning is an activity carried out by students as an active activity in the Biology Student Association (Himbio) based on programs of activities that are mandatory and optional to support the formation of student character to be ready to enter the world of work. As a process, the three learning patterns above will be implemented integratively. Technical implementation of co-curricular and extracurricular integration systems can be seen in.

B. PROCESSES AND STANDARDS

Evaluation is done in the learning process (formative) or at the end of the study process (summative). Evaluation of learning outcomes is carried out continuously to measure the availability of the learning outcome of the course and to obtain feedback for improvement of the curriculum and the determination of graduation. The assessment standards for learning activities are as follows:

1. **The scope of assessment in the process:** the assessment includes the form: (1) Structured tasks that can be carried out in the form of co-curricular performance either as non-test assessment or performance assessment; (2) A daily test (quiz) or unit test which can be performed through a written test / deed test or oral test; (3) A Semester

Middle Test (UTS) performed in the middle of a semester or after 7 lectures; and (4) The Final Test of a Semester (UAS) is a scheduled test performed after all the teaching materials have been submitted in 14.

2. Assessment scores: a learning process to measure the level of competence using scores with ranges between 0-100.

4. The assessment weight: The Final Value (NA) is a combination of the Semester Middle Test (UTS), Semester Final Test (UAS), quizzes and all assignments given during the semester. The weight of each theoretical course component is 30% UTS, 30% UAS, 20% Task and 20% quizzes (or other percentage modifications of values if required); whereas the assessment weights for the internship include: 20% UTS, 20% UAS, 30% work sheet reporting, and 30% skill work. The evaluation of learning results is carried out using the PAP and PAN approaches, which describe the student's competence. The student's success in attending a course is indicated by a final score with a benchmark in this score:

Level of Ability	Quality (letter)	Quality (number)	Quality (degree)
$NA \geq 80$	A	4	Excellent
$68 \leq NA < 80$	B	3	Good
$56 \leq NA < 68$	C	2	Fair
$45 \leq NA < 56$	D	1	poor
$NA < 45$	E	0	Very poor

4. Assessment in the final completion of studies:

- The form of the completion activity of studies must be passed in the form of a final project path that must be proven externally: a thesis/journal article/prototype/activity report. The final project assessment is based on the external eligibility to be submitted equal to the examination requirement of the trial.
- The thesis is retained in the test session.
- Testing team consists of a minimum of five lecturers consisting of lecturer lecturer and three comprehensive lecturer.
- Students are declared to have graduated in the undergraduate yudisium and bear the degree of Bachelor of Science (S.Si), once they have completed the full load of Credit Semester (144 SKS) including the final project.

C. DESCRIPTION OF THE COURSE

Semester 1

Code: UNX0H10-2003	Religion	Credit Point: 2.00 (3.62 ECTS)
Islamic Religious Education is a compulsory course in the first semester at Padjadjaran University. This course will discuss the importance of Islamic religious education in higher education, The relationship between religion and humans. Three fundamental human problems that save human life, The source of Islamic values and laws in regulating the behavior of individuals and Muslim societies, and their superiority amid man-made laws, The pillar of religion and the Koran as a guide to		

life, Presenting the characteristics of Islamic society amid of the diversity of modern society, Islamic teachings in forming a clean and anti-corruption society and government.	
Lecture team	TPB/MKU
References	1. Islamic Religious Education Book 2. Islamic Religious Education Modul 3. Islamic Religious Education Brief Topic

Code: UNX01-007	Pancasila	Credit Point: 1.00 (1.81 ECTS)
This course discusses Pancasila as a study of the current history of the Indonesian nation, Pancasila as the Foundation and Ideology of the State, Pancasila		
Lecture team	TPB/MKU	
References	<ol style="list-style-type: none"> 1. Kemenristekdikti. 2016. Modul Pendidikan Pancasila Untuk Perguruan Tinggi. Jakarta: Dirjen Belmawa Kemenristekdikti 2. Ali, As'ad Said. 2009. Negara Pancasila Jalan Kemaslahatan Berbangsa. Jakarta: Pustaka LP3ES 3. Bakry, Noor Ms. 2010. Pendidikan Pancasila. Pustaka Pelajar:Yogyakarta 4. Kaelan. 2013. Negara Kebangsaan Pancasila: Kultural, Historis, Filosofis, Yuridis dan Aktualisasinya. Yogyakarta: Penerbit Paradigma 5. Kemenristekdikti. 2016. Modul Pendidikan Kewarganegaraan Untuk Perguruan Tinggi. Jakarta: Dirjen Belmawa. Kemenristekdikti 	

Code: UNX01-008	Civic Education	Credit Point: 1.00 (1.81 ECTS)
This course discusses Pancasila as a study of the current history of the Indonesian nation, Pancasila as the Foundation and Ideology of the State, Pancasila as a philosophical system, Pancasila as an ethical system and Pancasila as the value of developing science.		
Lecture team	M. Ali Mauludin, S.Pt., M.Si	
References	<ol style="list-style-type: none"> 1. Kemenristekdikti. 2016. Modul Pendidikan Pancasila Untuk Perguruan Tinggi. Jakarta: Dirjen Belmawa Kemenristekdikti 2. Ali, As'ad Said. 2009. Negara Pancasila Jalan Kemaslahatan Berbangsa. Jakarta: Pustaka LP3ES 3. Bakry, Noor Ms. 2010. Pendidikan Pancasila. Pustaka Pelajar:Yogyakarta 4. Kaelan. 2013. Negara Kebangsaan Pancasila: Kultural, Historis, Filosofis, Yuridis dan Aktualisasinya. Yogyakarta: Penerbit Paradigma 5. Kemenristekdikti. 2016. Modul Pendidikan Kewarganegaraan Untuk Perguruan Tinggi. Jakarta: Dirjen Belmawa. Kemenristekdikti 	

Code: UNX01-004	Indonesian Language	Credit Point: 2.00 (3.62 ECTS)
<p>The TPB Indonesian course consists of Indonesian communication skills both written and oral. In addition, it is strengthened by information literacy material which is very important to improve the quality of written works and presentations. The types of works discussed are not only scientific works, but also popular works. This will be the main support for the implementation of the Exercise Creativity and Entrepreneurship project. Starting from citizenship awareness in the frame of Pancasila and religious values, Indonesian becomes a communication tool that must be mastered so that the work that is successfully made is of high quality. The output of each student's work, later, will be a meaningful idea for this nation.</p>		
Lecture team	Dr. Mochamad Irfan Hidayatullah	
References	<ol style="list-style-type: none"> 1. Sugono, Dendy. Berbahasa Indonesia dengan Benar. 2. Puspa Swara, 1994. Alwi, Hasan, dkk. Tata Bahasa Baku Bahasa Indonesia. 3. Balai Pustaka, 2003. Keraf, Gorys. Diksi dan Gaya Bahasa. Gramedia, 1986. Pusat Bahasa. Buku Praktis Bahasa Indonesia 1 & 2. 4. Darmayanti, dkk.2010. Mahir Berbahasa Indonesia untuk Penutur Asing Jilid III .dan IV. Bandung: BIPA Fakultas Sastra Unpad. Materka, 5. Pat Roessle. 1990. Lokakarya dan Seminar. Yogyakarta: Kanisius 	

Code: UNX01-005	English	Credit Point: 2.00 (3.62 ECTS)
<p>English and Indonesian are two courses that encourage students to be able to apply logical, critical, systematic, and innovative thinking in the context of developing or implementing science and technology in the form of good writing and study skills. This course builds students' ability to be able to have independent, quality, and measurable performance. Furthermore, it is directed to be able to compile a scientific description of the results of the study above in the form of good writing that meets the basic rules of correct scientific writing. In the course of the process of building these abilities, students are in parallel form to also document, store, secure, and retrieve data to guarantee the validity and prevent plagiarism, and are responsible for the work of groups of students sharing disciplines involving community members.</p>		
Lecture team	TPB/MKU	
References	<ol style="list-style-type: none"> 1. Official Guide to the TOEFL Test (ETS) 2. Official TOEFL iBT Tests (ETS) 3. Cambridge Preparation for the TOEFL iBT Test (CUP) 4. TOEFL Preparation Course (Macmillan) TOEFL iBT (Barron) 5. TOEFL iBT Prep Plus (Kaplan) 6. The TOEFL iBT Test Prep Planner (ETS) 7. Essential Words for the TOEFL (Barron's) 	

Code: UNX10-1309	Exercise Creativity and Entrepreneurship	Credit Point: 3.00 (5.43 ECTS)
Exercise Creativity and Entrepreneurship is given to achieve the goals of the TPB program through various materials that have been designed and outlined in the learning module.		
Lecture team	TPB/MKU : Dr. apt. Sandra Megantara, M.Farm	
References	<ol style="list-style-type: none"> 1. British Council. (2017). Active Citizens Facilitator's Toolkit. 2. Harris & Harris. (2005). Enhancing Educational Effectiveness: Group Facilitation Skills and Experiential Learning. Pre-Conference Workshop for the 12th National Conference on Students in Transition. Costa Mesa: California. 3. Kementerian PPN/Bappenas. Apa itu SDG's. Retrieved from: http://sdgsindonesia.or.id/ 4. Macpherson, A. (2015). Introduction to Appreciative Inquiry: Change at the Speed of Imagination. https://www.researchgate.net/publication/276093904, 1-19. 5. Myers, et al., (2012). The Self in Social World. Social Psychology 12th Edition. McGraw Hill: USA. 	

Code: D10D-1001	Basic Biology	Credit Point: 3.00 (5.43 ECTS)
Basic Biology courses are carried out by containing basic concepts of safety and hygiene in the laboratory, basic principles of microscope components and use, the chemistry of life, basic concepts of cells and heredity factors, basics about the microbial world, basic principles of plant and animal taxonomy, basic concepts of plant and animal biosystems, biodiversity and ecosystems. Each material provided will be delivered in line with the implementation of the practicum. By following this course, students are expected to know and understand the basic concepts of Biology in the scientific study of Biology which is harmonized with the development of Biology.		
Lecture team	<ol style="list-style-type: none"> 1. Dr. Keukeu Kaniawati Rosada 2. Dr. Teguh Husodo 3. Dr. Mia Miranti 4. Drs. Joko Kusmoro, MP 	
References	<ol style="list-style-type: none"> 1. Reece, J. B., & Campbell, N. A. (2011). Campbell biology. Boston: Benhoursin Cummings / Pearson. 2. Urry, L. A., Cain, M. L. I., Wasserman, S. A., Minorsky, P. V., Reece, J.B., & Campbell, N. A. (2017). Essential biology. Eleventh edition. New York, NY: Pearson Education, Inc. 	

Code: D10D-1002	Practicum of Basic Biology	Credit Point: 1.00 (1.81 ECTS)
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<p>The Basic Biology Practicum course is carried out by practicing the concepts of safety and hygiene in the laboratory, basic principles of microscope components and use, basic concepts of cells and heredity factors, basics about the microbial world, basic principles of plant and animal taxonomy, basic concepts of plant and animal biosystems, biodiversity and ecosystems. Each practicum activity provided will be delivered in line with the material in the theoretical practicum. By following this course, students are expected to understand and practice the basic concepts of Biology in the scientific study of Biology which is harmonized with the development of Biology.</p>	
Lecture team	<ol style="list-style-type: none"> 1. Dr. Keukeu Kaniawati Rosada 2. Dr. Teguh Husodo 3. Dr. Mia Miranti 4. Drs. Joko Kusmoro, MP
References	<ol style="list-style-type: none"> 1. Reece, J. B., & Campbell, N. A. (2011). Campbell biology. Boston: Benhoursin Cummings / Pearson. 2. Urry, L. A., Cain, M. L. I., Wasserman, S. A., Minorsky, P. V., Reece, J.B., & Campbell, N. A. (2017). Essential biology. Eleventh edition. New York, NY: Pearson Education, Inc.

Code: D10D-1003	Bioprospection	Credit Point: 2.00 (3.62 ECTS)
<p>Introduction to Bioprospection is a compulsory course for Biology students in Semester 2. In this course, learning materials are provided to introduce the basic concepts of bioprospection, especially in the context of protecting natural resources and natural resources, which can be oriented towards ecological economics and bioproducts through face-to-face methods (online) with deepening based on providing examples of potentially commercial products. In the learning design, students are expected to realize the potential of the rich biodiversity in Indonesia and will bring up an attitude of ownership and responsibility for the wealth of SDH / natural resources in Indonesia; can develop creative thinking by seeing innovative opportunities from the field of biology with a biopreneurship orientation based on examples of experiences given.</p>		
Lecture team	<ol style="list-style-type: none"> 1. Asri Peni Wulandari Ph.D 2. Prof. Dr.Nia Rossiana 3. Dr. Melani 4. Dr. Teguh Husodo 5. Dra. Nining Ratningsing, M.IL. 6. Dr. Ruly Budiono 	
References	<ol style="list-style-type: none"> 1. https://docplayer.info/214687034-Bioprospecting-di-indonesia.html 2. https://www.researchgate.net/publication/264238213_Bioprospecting 3. and others as recommended by the lecturer 	

Code: D10D-1004	Biomathematics and Computation	Credit Point: 2.00 (3.62 ECTS)
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This course discusses the real number system, functions and their types, limit, and continuity of functions, derivatives of functions and their applications, integrals, and their applications, and integrating techniques.	
Lecture team	1. Asep Kuswandi Supriatna 2. Nursanti Anggriani.
References	1. Purcell, E.J.& Varberg, D 1984 "Kalkulus dan Geometri Analitis", jilid 1, terjemahan edisi 5. Erlangga. 2. Stewart, J. 1998. "Kalkulus", jilid 1, terjemahan edisi 4. Erlangga. 3. Martono, K. 1999. Kalkulus. Erlangga

Semester 2

Code: D10D-2001	General Ecology	Credit Point: 2.00 (3.62 ECTS)
The General Ecology course explains the basic principles of ecology in ecosystems and the environment, ecological spectrum, ecological systems, environmental factors in ecosystems, matter and energy, adaptation, ecosystem stability, niches, succession, carrying capacity, and ecosystem types.		
Lecture team	1. Dr. Keukeu Kaniawati Rosada 2. Dr. Susanti Withaningsih 3. Nurullia Fitriani, S.Si, MT 4. Dr. Indri Wulandari	
References	1. Dash, M. C., & Dash, S. P. (2009): Fundamentals of Ecology (3rd ed.), Tata McGraw-Hill Education Private Limited, New Delhi. 2. M. Begon, R.W. Howarth & C.R. Townsend (2014): Essentials of Ecology (4th ed). 3. Odum, E. P. (1971): Fundamentals of ecology (3rd ed.), W.B. Saunders Company, Philadelphia. 4. Urry, L.A., Cain, M.L., Wasserman, S.A., Mihorsky, P.V. dan Reece, J.B. (2016). Campbell Biology, 11 th edition. Pearson. New york	

Code: D10D-2002	Plants Structure and Development I	Credit Point: 2.00 (3.62 ECTS)
Plant Structure and Development 1 course, studies aspects of the external structure of plants (morphology) which includes vegetative organs (roots, stems and leaves) and generative organs (flowers, fruits and seeds) as well as the development and modification of plant organs. This course also studies terminology for plant description purposes.		
Lecture team	1. Joko Kusmoro, MP 2. Betty Mayawatie, MSi 3. Dr. Suryana, S.Si., MP. 4. Dr. Budi Irawan, M.Si	
References	1. Tjitrosoepomo G. 1994. Morfologi Tumbuhan. Yogyakarta. Gadjah Mada University Press.	

	<p>2. Clarke I and Lee H. 1994. Name that Flower, The Identification of Flowering Plants. Melbourne University Press</p> <p>3. Harris JG and Harris MW, Plant Identification Terminology, an illustrated Glossary. Utah: Spring Lake Publishing</p> <p>4. Hidayat EB. 1992. Morfologi dan Perkembangan Tumbuhan. FMIPA ITB</p> <p>5. Bell AD. 1991. Plant Form, an Illustrated Guide to Flowering Plant Morphology. Oxford University Press.</p> <p>6. Rosanti D. 2013. Morfologi Tumbuhan. Jakarta: Penerbit Erlangga</p> <p>7. Stearn WT. 1998. Botanical Latin. Timber Press, Inc. Portland Oregon</p> <p>8. Baumgardt JP. 1994. How to Identify Flowering Plant Family. Timber Press, Inc. Portland Oregon</p>
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Code: D10D-2003	Practicum of Plants Structure and Development I	Credit Point: 1.00 (1.81 ECTS)
<p>Plant Structure and Development Practicum 1 course, studies aspects of the external structure of plants (morphology) which includes vegetative organs (roots, stems, and leaves) and generative organs (flowers, fruits, and seeds) as well as the development and modification of plants organs and vegetative and generative organs of lower plants. This course also studies the terminology of plant description and the basis for making botanical illustrations.</p>		
Lecture team	<p>1. Dr. Budi Irawan, M.Si</p> <p>2. Joko Kusmoro, MP</p> <p>3. Betty Mayawatie, MSi</p> <p>4. Dr. Suryana, S.Si., MP.</p>	
References	<p>1. Tjitrosoepomo G. 1994. Morfologi Tumbuhan. Yogyakarta. Gadjah Mada University Press.</p> <p>2. Clarke I and Lee H. 1994. Name that Flower, The Identification of Flowering Plants. Melbourne University Press</p> <p>3. Harris JG and Harris MW, Plant Identification Terminology, an illustrated Glossary. Utah: Spring Lake Publishing</p> <p>4. Hidayat EB. 1992. Morfologi dan Perkembangan Tumbuhan. FMIPA ITB</p> <p>5. Bell AD. 1991. Plant Form, an Illustrated Guide to Flowering Plant Morphology. Oxford University Press.</p> <p>6. Rosanti D. 2013. Morfologi Tumbuhan. Jakarta: Penerbit Erlangga</p> <p>7. Stearn WT. 1998. Botanical Latin. Timber Press, Inc. Portland Oregon</p> <p>8. Baumgardt JP. 1994. How to Identify Flowering Plant Family. Timber Press, Inc. Portland Oregon</p>	

Code: D10D-2004	Animals Structure and Physiology I	Credit Point: 2.00 (3.62 ECTS)
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This course studies the anatomical and histological structure and function of the animal body system, which consists of an introduction: animal body organization, directions, and fields in anatomy; animal cells; basic tissues (epithelial and connective); integumentary system; nervous system and senses; and muscular and skeletal systems.	
Lecture team	<ol style="list-style-type: none"> 1. Dr. Yasmi P. Kuntana 2. Dr. Desak Made Malini 3. Dr. Kartiawati Alipin 4. Dra. Nining Ratningsih MIL. 5. Madihah, S.Si., M.Si
References	<ol style="list-style-type: none"> 1. Gartner L.P. and Hiatt J.L. 2006. Color Textbook of Histology, 3rd ed. Saunders Elsevier: Philadelphia. 2. Drake, R.L, Vogl, W and Mitchell, A.W.M. 2007. Gray's Anatomy for Students. Saunders Elsevier: Philadelphia. 3. Harver, H.A., V.W. Rodwell & P.A. Mayes. 1997. Review of Physiology Chemistry. Lange Medical Publishing. Los Altos California. 4. Vander, A.J., H.S. hourses & D.S. Luciano. 1994. Human Physiology. McGraw-Hill Inc. New York. St Louis. San Francisco. 5. Tortora, G.G. & N.P. Anagnostakos. 1984. Principles of Anatomy and Physiology, 4th ed. Harper & Row Publishers: New York

Code: D10D-2005	Practicum of Animals Structure and Physiology I	Credit Point: 1.00 (1.81 ECTS)
This course studies the anatomical and histological structure and function of the animal body system, which consists of an introduction: animal body organization, directions, and fields in anatomy; animal cells; basic tissues (epithelial and connective); integumentary system; nervous system and senses; and muscular and skeletal systems.		
Lecture team	<ol style="list-style-type: none"> 1. Dr. Yasmi P. Kuntana 2. Dr. Desak Made Malini 3. Dr. Kartiawati Alipin 4. Dra. Nining Ratningsih MIL. 5. Madihah, S.Si., M.Si 	
References	<ol style="list-style-type: none"> 1. Gartner L.P. and Hiatt J.L. 2006. Color Textbook of Histology, 3rd ed. Saunders Elsevier: Philadelphia. 2. Drake, R.L, Vogl, W and Mitchell, A.W.M. 2007. Gray's Anatomy for Students. Saunders Elsevier: Philadelphia. 3. Harver, H.A., V.W. Rodwell & P.A. Mayes. 1997. Review of Physiology Chemistry. Lange Medical Publishing. Los Altos California. 4. Vander, A.J., H.S. hourses & D.S. Luciano. 1994. Human Physiology. McGraw-Hill Inc. New York. St Louis. San Francisco. 5. Tortora, G.G. & N.P. Anagnostakos. 1984. Principles of Anatomy and Physiology, 4th ed. Harper & Row Publishers: New York 	

Code: D10D-2006	Microbiology	Credit Point: 3.00 (5.43 ECTS)
This course covers knowledge of the basic concepts of microbiology (history, cell structure and function, metabolism, genetics), diversity of microorganisms, control of microorganisms, the benefits and impacts of microorganisms in the environment, the use of software, basic instruments and standard methods for the analysis of microorganisms in general and how to document, store and analyze work data and complete assignments in groups and independently.		
Lecture team	<ol style="list-style-type: none"> 1. Dr. Mia Miranti Rustama 2. Prof. Ratu Safitri 3. Prof. Nia Rossiana 4. Asri Peni Wulandari, Ph.D 5. Dr. Keukeu Kaniawati Rosada 6. Febri Doni, Ph.D 7. Yolani Syaputri, Ph.D 	
References	<ol style="list-style-type: none"> 1. Michael T. Madigan, John Martinko, Thomas Brock, Paul Dunlap, David P. Clark, 2009. Brock Biology of Microorganisms. Pearson/Benjamin Cummings. 1061 page 2. Amit Arora · 2021. Textbook of Immunology, Microbiology and Parasitology Books. Penerbit:B. Jain Publishers Pvt. Limited. 483 page 	

Code: D10D-2007	Practicum of Microbiology	Credit Point: 1.00 (1.81 ECTS)
This course covers knowledge of the basic practice of applying microbiology, the use of basic instruments and standard methods for the analysis of microorganisms in general and how to document, store and analyze work data and complete assignments in groups and independently.		
Lecture team	<ol style="list-style-type: none"> 1. Dr. Mia Miranti Rustama 2. Prof. Ratu Safitri 3. Prof. Nia Rossiana 4. Asri Peni Wulandari, Ph.D 5. Dr. Keukeu Kaniawati Rosada 6. Febri Doni, Ph.D 7. Yolani Syaputri, Ph.D 	
References	<ol style="list-style-type: none"> 1. Osman Erkmén, 2021. Laboratory Practices in Microbiology 1st Edition. Elsevier. 292 halaman 2. hourses G. Cappuccino and Natalie Sherman, 2014. Microbiology: A Laboratory Manual, 10th Edition Pearson. 300 halaman 	

Code: D10D-2008	Biodiversity	Credit Point: 3.00 (5.43 ECTS)
In the biodiversity course, students of the undergraduate Biology study program will be given material on the understanding of biodiversity, why biodiversity is very important for national development activities and the life of living things as a whole. Various aspects of biodiversity include the context of natural ecosystems and built ecosystems, including biodiversity between the two types of ecosystems. In		

<p>addition, in this course students will be given material related to aspects of biodiversity conservation, including those concerning conservation strategies for rare and protected animals.</p>	
Lecture team	<ol style="list-style-type: none"> 1. Prof. Parikesit, M,Sc., Ph.D 2. Prof. Dr. Wawan Hermawan, M.Sc. 3. Prof. Johan Iskandar, M.Sc., Ph.D. 4. Prof. Dr. Erri N Megantara 5. Drs. Hikmat Kasmara, M.Si. 6. Dr. Susanti Withaningsih, M.Si.
References	<ol style="list-style-type: none"> 1. Bappenas. 2003. Strategi dan Rencana Aksi Keanekaragaman Hayati Indonesia 2003-2020. Bappenas. Jakarta. 2. Edward.O.Wilson. 1992. The Diversity of Life. W.W. Norton & Company. 3. Fahrig, L. 2003. Effect of Habitat Fragmentation on Biodiversity. Ann. Rev. Ecol.Evol.Syst. 34:487-515. 4. Kantor Menteri Negara Lingkungan Hidup.1997.Agenda 21 Indonesia : A National Strategy for Sustainable Development. KMN LH dan UNDP. Jakarta. 5. Ines Omann, Andrea Stocker, Jill Jager. 2009. Climate Changes as a Threat to Biodiversity : An Application of the DPSIR Approach. Ecological Economics. Elsevier.

Code: D10D-2009	Literacy and Scientific Writing	Credit Point: 2.00 (3.62 ECTS)
<p>Scientific Writing Techniques course is a compulsory course for Semester 2 (two) students. After learning the basic concepts of library literacy and digital documentation of scientific literature; systematics and techniques of writing scientific papers, students will have the ability to carry out archive management of scientific literacy results by utilizing practical methods and software to write scientific papers in the form of practicum reports, research projects, and theses. At the end of the lecture, the minimum achievement is tested in the form of a simple paper.</p>		
Lecture team	<ol style="list-style-type: none"> 1. Prof. Dr. Wawan Hermawan, MS. 2. Dr. Keukeu K. Rosada 3. Annisa, Ph.D 4. Prof. Dr. Erri Noviar Megantara 5. Asri Peni Wulandari, M.Sc., Ph.D 6. Dr. rer. Nat. Tri Dewi K. Pribadi 7. Nurullia Fitriani, MT 8. Prof. Parikesit, M.Sc., Ph.D 	
References	<ol style="list-style-type: none"> 1. Spellman, F. R. and Price-Bayer, J. (2011). In Defense of Science: Why Scientific Literacy Matters. Lanham: Government Institutes. 2. Turabian, K. L. (2013). A Manual for Writers of Research Papers, Theses, and Dissertations. 8th Edition. Chicago: The University of Chicago Press. 3. Spires, H.A., Paul, C.M., and Kerkhoff, S.N. (2021). Digital Literacy for the 21st Century. Encyclopedia of 	

	information science and technology. Mehdi Khosrow-Pour, editor. Fourth edition. Hershey, PA
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Code: D10D-2010	Biostatistics	Credit Point: 3.00 (5.43 ECTS)
The Biological Statistics course studies the basic concepts of Statistics, Descriptive Statistics, Inference Statistics, the concept of chance, Parameter Estimation, Hypothesis Testing, Sampling Distribution, Basic Concepts of Experimental Design, Perfect randomized design, further tests, Randomized block design, missing data in randomized block design, incomplete randomized block design and Latin square design.		
Lecture team	1. Neneng Sunengsih, Dra., M.Stat. 2. Restu Arisanti, S.Si., M.Si.	
References	1. Mendenhall et.al. Introduction to Probability Statistics 2. Sudjana. Metoda Statistika 3. Walpole, ER. Pengantar Statistika	

SEMESTER 3

Code: D10D-3001	Cell and Molecular Biology	Credit Point: 2.00 (3.62 ECTS)
Cell and molecular biology course is a compulsory course in Biology Study Program. This course studies cells (prokaryotes and eukaryotes), cell organelles, cell nuclei, intercellular communication (junctions), cell death (apoptosis), dogma central principles of molecular biology, to the introduction of synthetic biology.		
Lecture team	1. Annisa, M.Si., Ph.D 2. Dr. Sri Rejeki Rahayuningsih 3. Dr. Madihah 4. Yolani Syaputri, Ph.D	
References	1. Harvey Lodish; Arnold Berk; Chris A. Kaiser; Monty Krieger; Anthony Bretscher; Hidde Ploegh; Kelsey C. Martin; Michael Yaffe; Angelika Amon. 2021. Molecular Cell Biology, 9th Edition. W. H. Freeman. NY. 2. Bruce Alberts, Alexander Johnson, Julian Lewis, David Morgan, Martin Raff, Keith Roberts, Peter Walter. 2015. Molecular Biology of the Cell, 6th Edition. Garland Science. NY. 3. Jocelyn E. Krebs, Elliott S. Goldstein, Stephen T. Kilpatrick. 2018. Lewin's Gene XII. Jones & Bartlett. Massachusetts	

Code: D10D-3002	Practicum of Cell and Molecular Biology	Credit Point: 1.00 (1.81 ECTS)
Cell and molecular biology course is a compulsory course in Biology Study Program. This course studies cells (prokaryotes and eukaryotes), cell organelles, cell nuclei, intercellular communication (junctions), cell death (apoptosis), dogma central principles of molecular biology, to the introduction of synthetic biology.		
Lecture team	1. Annisa, M.Si., Ph.D	

	2. Dr. Sri Rejeki Rahayuningsih
References	<p>1. Harvey Lodish; Arnold Berk; Chris A. Kaiser; Monty Krieger; Anthony Bretscher; Hidde Ploegh; Kelsey C. Martin; Michael Yaffe; Angelika Amon. 2021. Molecular Cell Biology, 9th Edition. W. H. Freeman. NY.</p> <p>2. Bruce Alberts, Alexander Johnson, Julian Lewis, David Morgan, Martin Raff, Keith Roberts, Peter Walter. 2015. Molecular Biology of the Cell, 6th Edition. Garland Science. NY.</p> <p>3. Jocelyn E. Krebs, Elliott S. Goldstein, Stephen T. Kilpatrick. 2018. Lewin's Gene XII. Jones & Bartlett. Massachusetts</p>

Code: D10D-3003	Plants Structure and Development II	Credit Point: 2.00 (3.62 ECTS)
This course contains knowledge about the structure and tissue of meristems, epidermis, support, vessels (vascular), and secretion glands. Also studied are the structure and development of leaf organs, stems, roots, flowers, fruits, seeds, and embryo development and germination.		
Lecture team	<p>1. Dr. Mohamad Nurzaman</p> <p>2. Dr. Tia Setiawati</p> <p>3. Dr. Asep Zainal Mutaqin</p> <p>4. Ruly Budiono, M.S</p>	
References	<p>1. Esau, K. 1965. Plant Anatomy, 2nd edition, John Willey & Sons Inc. New York.</p> <p>2. Esau, K. 1977. Anatomy of Seed Plants, 2nd edition, John Willey & Sons Inc. New York</p> <p>3. Fahn, A. 1990. Plant Anatomy, 4th edition, Bergamon Press New York.</p> <p>4. Estiti B. Hidayat. 1995. Anatomi Tumbuhan Berbiji. Penerbit ITB.</p>	

Code: D10D-3004	Practicum of Plants Structure and Development II	Credit Point: 1.00 (1.81 ECTS)
Explain theoretically and practically about the structure of cells, tissues and organs along with their development and function. Through observing cells, tissues, vegetative organs and generative organs by making wet preparations. Consists of: Introduction; how to use and observe with a microscope, how to make preparations, observing cells, protoplasmic and non-protoplasmic components; Types of tissue, primary tissue, primary and secondary meristem. Types of epidermis mature tissue and epidermis derivatives, ground tissue, mechanical tissue, vascular tissue, secretory tissue; Stem organs: Root organs, Leaf organs, Fruit, Seeds and Flowers		
Lecture team	<p>1. Dr. Mohamad Nurzaman</p> <p>2. Dr. Tia Setiawati</p> <p>3. Ruly Budiono, M.S</p> <p>4. Asep Zaenal Muttaqien, MT</p>	

References	<ol style="list-style-type: none"> 1. Gartner L.P. and Hiatt J.L. 2006. Color Textbook of Histology, 3rd ed. Saunders Elsevier: Philadelphia. 2. Drake, R.L, Vogl, W and Mitchell, A.W.M. 2007. Gray's Anatomy for Students. Saunders Elsevier: Philadelphia. 3. Harver, H.A., V.W. Rodwel & P.A. Mayes. 1997. Review of Physiology Chemistry. Lange Medical Publishing. Los Altos California. 4. Vander, A.J., H.S. James & D.S. Luciano. 1994. Human Physiology. McGraw-Hill Inc. New York. St Louis. San Fransisco. 5. Tortora, G.G. & N.P. Anagnostakos. 1984. Principles of Anatomy and Physiology, 4th ed. Harper & Row Publishers: New York
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Code: D10D-3005	Animals Structure and Physiology II	Credit Point: 3.00 (5.43 ECTS)
This course studies the anatomical and histological structures and functions for normal physiological activities of the animal body system. The form, structure, and function are explained in relation to the regulation of the body system as a whole, and compared with other vertebrate animals (Pisces, amphibians, reptiles, aves, and mammals).		
Lecture team	<ol style="list-style-type: none"> 1. Dr. Kartiawati Alipin 2. Dra. Nining Ratningsih MIL. 3. Dr. Desak Made Malini 4. Dr. Yasmi P. Kuntana 5. Madihah, M.Si 	
References	<ol style="list-style-type: none"> 1. Gartner L.P. and Hiatt J.L. 2006. Color Textbook of Histology, 3rd ed. Saunders Elsevier: Philadelphia. 2. Drake, R.L, Vogl, W and Mitchell, A.W.M. 2007. Gray's Anatomy for Students. Saunders Elsevier: Philadelphia. 3. Harver, H.A., V.W. Rodwel & P.A. Mayes. 1997. Review of Physiology Chemistry. Lange Medical Publishing. Los Altos California. 4. Vander, A.J., H.S. Hourses & D.S. Luciano. 1994. Human Physiology. McGraw-Hill Inc. New York. St Louis. San Fransisco. 5. Tortora, G.G. & N.P. Anagnostakos. 1984. Principles of Anatomy and Physiology, 4th ed. Harper & Row Publishers: New York 	

Code: D10D-3006	Practicum of Animals Structure and Physiology II	Credit Point: 1.00 (1.81 ECTS)
This course studies the male reproductive system, the female reproductive system, the structure of the respiratory system, respiration in fish, advanced embryogenesis & neurulation, cardiovascular system function, immune system, structure of the urinary system, histology of the digestive system, anatomy and function of the digestive system, and endocrine system		
Lecture team	<ol style="list-style-type: none"> 1. Dr. Desak Made Malini 2. Dr. Yasmi P. Kuntana 3. Dra. Nining Ratningsih MIL 	

References	<ol style="list-style-type: none"> 1. Gartner L.P. and Hiatt J.L. 2006. Color Textbook of Histology, 3rd ed. Saunders Elsevier: Philadelphia. 2. Drake, R.L, Vogl, W and Mitchell, A.W.M. 2007. Gray's Anatomy for Students. Saunders Elsevier: Philadelphia. 3. Harver, H.A., V.W. Rodwel & P.A. Mayes. 1997. Review of Physiology Chemistry. Lange Medical Publishing. Los Altos California. 4. Vander, A.J., H.S. James & D.S. Luciano. 1994. Human Physiology. McGraw-Hill Inc. New York. St Louis. San Fransisco. 5. Tortora, G.G. & N.P. Anagnostakos. 1984. Principles of Anatomy and Physiology, 4th ed. Harper & Row. Publishers: New York
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Code: D10D-3007	Animal Development	Credit Point: 2.00 (3.62 ECTS)
<p>This course studies the process of embryonic growth and development until an embryo is formed that resembles an adult individual which involves the processes of growth, morphogenesis, and differentiation. Gametogenesis, fertilization process, cleavage, blastulation, gastrulation & neurulation, early and advanced organogenesis (ectoderm, mesoderm, endoderm derivatives), embryo adaptation, and normal development and developmental abnormalities are studied.</p>		
Lecture team	<ol style="list-style-type: none"> 1. Dr. Kartiawati Alipin 2. Dr. Desak Made Malini 3. Dr. Yasmi P. Kuntana 4. Madihah, M.Si 	
References	<ol style="list-style-type: none"> 1. Gilbert, S.F. 2000. Developmental Biology, 6th ed. Sunderland: Sinauer Associates, Inc. 2. Johnson, M. & B. Everitt. 1988. Essential Reproduction, 3rd ed. Oxford: Blackwell Scientific Publications 3. Sadler, T.W. 1990. Langmans medical Embriology. 6 th ed. Baltimore Mariland: Williams & Wilkins 4. Carlson, B. M. 1996. Patten's foundations of embryology, 6th ed. New York: McGraw-Hill, Inc 5. Turner, C.D. & Joseph T.B. 1976. Endokrinologi Umum. Airlangga University Press. 	

Code: D10D-3008	Practicum of Animal Development	Credit Point: 1.00 (1.81 ECTS)
<p>The animal development practicum studies about male reproductive system, spermatogenesis, female reproductive system, oogenesis, fertilization, early embryogenesis, late embryogenesis, chicken embryo observation methods, fetus observation methods, metamorphosis, regeneration.</p>		
Lecture team	<ol style="list-style-type: none"> 1. Dr. Kartiawati Alipin 2. Dr. Desak Made Malini 3. Dr. Yasmi P. Kuntana 4. Madihah, M.Si 	
References	<ol style="list-style-type: none"> 1. Gilbert, S.F. 2000. Developmental Biology, 6th ed. Sunderland: Sinauer Associates, Inc. 	

	<ol style="list-style-type: none"> 2. Johnson, M. & B. Everitt. 1988. Essential Reproduction, 3rd ed. Oxford: Blackwell Scientific Publications 3. Sadler, T.W. 1990. Langmans medical Embriology. 6 th ed. Baltimore Mariland: Williams & Wilkins 4. Carlson, B. M. 1996. Patten's foundations of embryology, 6th ed. New York: McGraw-Hill, Inc 5. Turner, C.D. & Joseph T.B. 1976. Endokrinologi Umum. Airlangga University Press
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Code: D10D-3009	Plant Taxonomy	Credit Point: 3.00 (5.43 ECTS)
<p>The Plant Taxonomy course studies plant diversity based on the Plant and Fungi classification system, taxonomic principles and principles, identifying plants and fungi through characterizing morphology, anatomy and external structure of pollen/spores, compiling plant descriptions, identification using plant identification keys, plant nomenclature , Plant grouping, herbarium creation and management techniques, taxonomic evidence and studying plant relationship analysis</p>		
Lecture team	<ol style="list-style-type: none"> 1. Dr. Budi Irawan, M.Si. 2. Joko Kusmoro, MP 3. Dr. Suryana, MP 	
References	<ol style="list-style-type: none"> 1. Rideng IM. 1989. Taksonomi Tumbuhan Biji. Jakarta: Dirjen DIKTI Proyek Pengembangan LPTK 2. Jones, S.B. and Luchsinger, A.E. 1987. Plant Systematic, Second Edition. McGraw-Hill. Singapore. 3. Simpson MG. 2006. Plants Systematics. Elsevier, Canada. 4. Tjitrosoepomo, G.1993. Taksonomi Umum, Dasar-dasar Taksonomi Tumbuhan. Yogyakarta: UGM Press. 5. Lieske, E. dan R. Myers. 2001. Reef Fishes of The World. Revised Edition. Periplus. Singapore. 6. Rohlf, F.J. 1998. NTSYSpc Version 2.0. Exeter Software. Setauket, New York. 	

Code: D10D-3010	Practicum of Plant Taxonomy	Credit Point: 1.00 (1.81 ECTS)
<p>The Plant Taxonomy Practicum course practices how plant description, plant planting, plant character spots, algae identification, fungus and lichen identification, moss and fern identification, morphology as taxonomic evidence, identification key, anatomy and palynology as taxonomic evidence, herbarium techniques, and numerical taxonomy.</p>		
Lecture team	<ol style="list-style-type: none"> 1. Dr. Budi Irawan, M.Si 2. Joko Kusmoro, MP 3. Dr. Suryana, MP 	
References	<ol style="list-style-type: none"> 1. Rideng IM. 1989. Taksonomi Tumbuhan Biji. Jakarta: Dirjen DIKTI Proyek Pengembangan LPTK 2. Jones, S.B. and Luchsinger, A.E. 1987. Plant Systematic, Second Edition. McGraw-Hill. Singapore. 3. Simpson MG. 2006. Plants Systematics. Elsevier, Canada. 	

	<p>4. Tjitrosoepomo, G.1993. Taksonomi Umum, Dasar-dasar Taksonomi Tumbuhan. Yogyakarta: UGM Press.</p> <p>Lieske, E. dan R. Myers. 2001. Reef Fishes of The World. Revised Edition. Periplus. Singapore.</p> <p>5. Rohlf, F.J. 1998. NTSYSpc Version 2.0. Exeter Software. Setauket, New York.</p>
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Code: D10D-3011	Animal Taxonomy	Credit Point: 3.00 (5.43 ECTS)
<p>The Animal taxonomy course studies how the system of naming, classification, and description of animals. In addition, it also learns how procedures in taxonomy, and type of specimens, to be able to categorize at the species level and the International Code of Zoological Nomenclature. This course forms the basis for other courses such as ecology, biosystematics, and evolution, as well as compulsory and elective courses in bioscience specializations, such as vertebrate and invertebrate taxonomy.</p>		
Lecture team	<p>1. Drs. Hikmat Kasmara, M.S. 2. Prof. Dr. Wawan Hermawan 3. Drs. Tatang Suharman Erawan, M.I.L. 4. Dr. Melanie, M.Si 5. Dr. Eneng Nunuz Rohmatullayaly, M.Si.</p>	
References	<p>1. Barnes, R.D. 1974. Invertebrate Zoology. W.B. Saunders Co. Philadelphia.</p> <p>2. Bauchot, R. (Editor), 1994. Snakes A Natural History. Sterling Publishing Co., Inc. New York.</p> <p>3. Beehler, B.M., T.K. Pratt and D.A. Zimmerman. 1986. Bird of new Guinea. Princeton Univ Press, New Jersey.</p> <p>4. Borradaile, L.A. and F.A. Potts. 1967. The Invertebrata. 4th Edition, the Univ. Press, Cambridge.</p> <p>5. Brusca, R. C., & Brusca, G. J. (2003). Invertebrates (No. QL 362. B78 2003). Basingstoke.</p>	

Code: D10D-3012	Practicum of Animal Taxonomy	Credit Point: 1.00 (1.81 ECTS)
<p>The Animal Taxonomy Practicum course practices how procedures in animal identification can be identified, described, and classified based on their morphological and morphometric characteristics. In addition, students are introduced to type specimens as a reference in naming and the International Code of Zoological Nomenclature. This course is the basis for other courses such as ecology, biosystematics, and evolution, as well as being a prerequisite course in vertebrate and invertebrate taxonomy courses for bioscience specialization fields.</p>		
Lecture team	<p>1. Drs. Hikmat Kasmara, M.S. 2. Prof. Dr. Wawan Hermawan 3. Drs. Tatang Suharman Erawan, M.I.L. 4. Dr. Melanie, M.Si 5. Dr. Eneng Nunuz Rohmatullayaly, M.Si.</p>	
References	<p>1. Agoes, R., Hanna, O., & Djaenudin, N.(1999). Penuntun Praktikum Parasitologi II (Entomologi Medik).</p>	

	<p>Bagian Parasitologi Fakultas Kedokteran Unpad, Bandung.</p> <p>2. Borror, D. J., Triphelorn, C. A., & Jhonson, N.F. (1992). Pengenalan Pelajaran Serangga, Edisi keenam. Gama Press, Yogyakarta.</p> <p>3. Brown, H. W. (1979). Dasar – Dasar Parasitologi Klinis. Penerbit Gramedia, Jakarta.</p> <p>4. Brusca, R. C., & Brusca, G. J. (2003). Invertebrates (No. QL 362. B78 2003). Basingstoke.</p> <p>5. Caroline, et al. 1994. Coral Reef Monitoring Manual for the Caribbean and Wester Atlantic. National Park Service, VirginIslands National Park.</p>
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SEMESTER 4

Code: D10D-4001	Genetics	Credit Point: 2.00 (3.62 ECTS)
<p>This course covers understanding the basics of inheritance of traits, Mendel's Law and its deviations, diversity in nature, and exploring and being able to analyze events in nature, especially in the field of biology from a genetic aspect. The material provided includes Mendelism: monohybrid, dihybrid, segregation, independent assortment; Probability theory, and inheritance of traits; Mendel's exceptions: allele interactions, gene interactions, polygenes, double alleles, sex determination, sex-linked; and inheritance; Structure and function of chromosomes and genes; genetic code; transcription and translation; Mitosis; meiosis; cell cycle; Mutation; Linkage, crossing over, and recombination; Chromosome mapping; Population Genetics.</p>		
Lecture team	<p>1. Annisa, M.Si., Ph.D 2. Dr. Sri Rejeki Rahayuningsih 3. Nining Ratningsih, Dra., MIL.</p>	
References	<p>1. Snustad D.P and Simmons M, J 2012. Principles of Genetics, 6th Ed. John Wiley & Sons, Inc. NJ. 2. Brooker, R.J. 2012. 6th Ed. Genetics: Analysis and Principles, 5th Ed. Mc.Graw-Hill. 3. NY Griffiths, A.J.F., Wessler, S.R., Carool, S.B., and Doebley, J. 2015. Introduction to Genetics Analysis, 11th Ed. M.H. Freeman and company. NY.</p>	

Code: D10D-4002	Practicum of Genetics	Credit Point: 1.00 (1.81ECTS)
<p>This course is a compulsory practicum course where students can better understand the discussion of genetics given in the theory class. This course covers the application of the introduction of animal research models of <i>Drosophila melanogaster</i>, Mendel's Law, sex-linked, chromosomes during mitosis, polytene chromosomes, chromatography, and population genetics.</p>		
Lecture team	<p>1. Annisa, M.Si., Ph.D 2. Dr. Sri Rejeki Rahayuningsih 3. Nining Ratningsih, Dra., MIL.</p>	

References	<ol style="list-style-type: none"> 1. Markow, Therese A. and Patrick O'Grady. 2006. <i>Drosophila: A Guide to Species Identification and Use</i>. California. Elsevier. 2. Sullivan, William, and Hawley, R. Scott. 2000. <i>Drosophila Protocols</i>. New York. Cold Spring Harbor Laboratory Press. 3. Snustad D.P and Simmons M, J 2012. <i>Principles of Genetics</i>, 6th Ed. John Wiley & Sons, Inc. NJ.
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Code: D10D-4003	Plant Physiology	Credit Point: 2.00 (3.62 ECTS)
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Plant Physiology is a compulsory course that studies the understanding and scope of plant physiology, which includes physiological processes that occur in plants. This course studies the relationship between water and plants, metabolic processes (photosynthesis and respiration), the role of phytohormones in influencing growth and development, the role of nutrients (macro and micronutrients), and their deficiencies. In addition, various types of motion in plants that are influenced by stimulation or no stimulation from the environment are also studied. This course also includes learning about the concept of secondary metabolites and their relationship with the development of plant biotechnology such as tissue culture.

Lecture team	<ol style="list-style-type: none"> 1. Dr. Mohamad Nurzaman, M.Si 2. Dr. Tia Setiawati, M.Si 3. Drs. Ruly Budiono, M.Sc. 4. Rusdi, Ph.D 5. Asep Zainal Mutaqin, M.Si.
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References	<ol style="list-style-type: none"> 1. Djiwoseputro, D. 1994. <i>Pengantar Fisiologi Tumbuhan</i>. Cetakan ketiga belas. Jakarta: PT Gramedia Pustaka Utama 2. Lakitan, B. 2010. <i>Dasar-dasar Fisiologi Tumbuhan</i>. Ed I cetakan 8. Jakarta: Rajawali Pers 3. Salisbury, F. B. & C. W. Ross. 1995. <i>Fisiologi Tumbuhan</i>. Diterjemahkan oleh D. R. Lukman & Sumaryono. Bandung: ITB 4. Taiz, L. and Z. Eduardo. 1992. <i>Plant Physiology</i>. New York: The Benyamin Cumming Publishing Company. Inc.
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Code: D10D-4004	Practicum of Plant Physiology	Credit Point: 1.00 (1.81 ECTS)
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Plant Physiology Practicum is a compulsory course that studies the understanding and scope of plant physiology, which includes physiological processes that occur in plants. This course studies germination power, allelopathy, dormancy, phytohormones, growth location, plant movement, transpiration, respiration, nutrition, field capacity.

Lecture team	<ol style="list-style-type: none"> 1. Dr. Mohamad Nurzaman, M.Si 2. Dr. Tia Setiawati, M.Si 3. Drs. Ruly Budiono, MS, Ph.D 4. Rusdi, Ph.D 5. Dr. Asep Zainal Mutaqin, M.T.
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References	<ol style="list-style-type: none"> 1. Djiwoseputro, D. 1994. Pengantar Fisiologi Tumbuhan. Cetakan ketiga belas. Jakarta: PT Gramedia Pustaka Utama 2. Lakitan, B. 2010. Dasar-dasar Fisiologi Tumbuhan. Ed I cetakan 8. Jakarta: Rajawali Pers 3. Salisbury, F. B. & C. W. Ross. 1995. Fisiologi Tumbuhan. Diterjemahkan oleh D. R. Lukman & Sumaryono. Bandung: ITB 4. Taiz, L. and Z. Eduardo. 1992. Plant Physiology. New York: The Benyamin Cumming Publishing Company. Inc.
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Code: D10D-4005	Nature Conservation	Credit Point: 2.00 (3.62 ECTS)
<p>Conservation biology is a course that explains the basic principles of conservation biology and interdisciplinary science developed to face various challenges in protecting species and ecosystems to understand the problems and prospects. Conservation science has three elements: (1) studying the impact of human activities on the existence and sustainability of life on earth; (2) developing practical approaches to prevent species extinction, maintain genetic diversity within species, and improve all aspects of diversity on earth; and (3) studying all aspects of biodiversity on earth. Conservation biology course material consists of : interdisciplinary conservation biology approaches, ethical principles of conservation biology, terminology and history of conservation biology, conservation at the species, population, and ecosystem levels, concepts of plant and animal conservation, plant and animal conservation strategies, management of conservation friends and future prospects for conservation biology.</p>		
Lecture team	<ol style="list-style-type: none"> 1. Prof. Dr. Erri N Megantara. 2. Dr. Teguh Husodo, M.Si 3. Dr. Susanti Withaningsih, M.Si 	
References	<ol style="list-style-type: none"> 1. Bappenas. 2003. Strategi dan Rencana Aksi Keanekaragaman Hayati Indonesia 2003-2020. Bappenas. Jakarta. Edward.O.Wilson. 1992. The Diversity of Life. W.W. Norton & Company. 2. Fahrig, L. 2003. Effect of Habitat Fragmentation on Biodiversity. Ann. Rev. Ecol.Evol.Syst. 34:487-515. Kantor Menteri Negara Lingkungan Hidup.1997.Agenda 21 Indonesia : A National Strategy for Sustainable Development. KMNLH dan UNDP. Jakarta. 3. Ines Omann, Andrea Stocker, Jill Jager. 2009. Climate Changes as a Threat to Biodiversity : An Application of the DPSIR Approach. Ecological Economics. Elsevier. 4. Jocelyn F, Jacques L, Paul C, Max D , Pascal M. 2010. Managing Agricultural Change for Biodiversity Conservation in a Mediteranean upland. Biological Conservation. Elsevier. 5. Joshua J Lawler. 2009. Climate Change Adaptation Strategies for Resources Management and 	

	<p>Conservation Planning. The Year in Ecology and Conservation Biology. New York Academy of Sciences.</p> <p>6. Marcelo Tabarelli. 2010. Tropical Biodiversity in Human-Modified Landscape : What is our Trump Card. Biotropica.</p> <p>7. Vermeulen, S dan Koziell, I. 2002. Integrating Global and Local Values. A review of Biodiversity Assessment. International Institute for Environment and Development, London. UK.</p> <p>8. Wright, S.J. 2005. Tropical Forests in a Changing Environment. Trends Ecol. Evol. 20 : 553-560</p>
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Code: D10D-4006	Terrestrial Ecology	Credit Point: 3.00 (5.43 ECTS)
<p>Terrestrial ecology courses learn about the basic concepts of terrestrial ecology including concepts in plant ecology and animal ecology which include the concepts of population, community, succession, and characteristics of human-built terrestrial ecology.</p>		
Lecture team	<ol style="list-style-type: none"> 1. Prof. Parikesit, Ph.D 2. Dr. Teguh Husodo, MS 3. Drs. Tatang Hermawan, M.I.L 4. Dr. Susanti Withaningsih, M.Si 5. Nurullia Fitriani, S.Si, MT 6. Indri Wulandari., S. Si, M.I.L 	
References	<ol style="list-style-type: none"> 1. Odum, E dan Barrett, G.W. 2017. Fundamentals of Ecology. 5th Edition. Thompson. US 2. Chapin, F.S. , Matson, P.A., Vitousek, P. 2012. Principles of Terrestrial Ecosystem Ecology. Springer 3. Schulze, E., Beck, E., Müller-Hohenstein, K., Lawlor, D. dan Lawlor, G. 2005. Plant Ecology. Springer 4. Potter, T.D dan Colman, B.R. 2003. Handbook Of Weather, Climate, And Water : Dynamics, Climate,Physical Meteorology, Weather Systems, and Measurements. John Wiley and Sons. Canada 5. Budhu, M. 2011. Soil Mechanics And Foundations. John Wiley and Sons. Canada 6. Utomo, M. 2016. Ilmu Tanah Dasar-Dasar dan Pengelolaan. Kencana. Jakarta 7. Allaby, M. 2010. ECOLOGY: Plants, Animals, and the Environment. Facts On File, Inc.New York 	

Code: D10D-4007	Practicum of Terrestrial Ecology	Credit Point: 1.00 (1.81ECTS)
<p>In the terrestrial ecology practicum course, undergraduate Biology Study Program students will be given material about the tools used in measuring environmental parameters, especially climatic factors, as well as methods commonly used in terrestrial ecology data collection.</p>		
Lecture team	<ol style="list-style-type: none"> 1. Prof. Parikesit, M,Sc., Ph.D 2. Dr. Teguh Husodo, M.Si 	

	<p>3. Dr. Susanti Withaningsih, M.Si 4. Tatang S. Erawan, M.I.L 5. Nurullia Fitriani, MT 6. Indri Wulandari, M.I.L</p>
References	<p>1. Odum. 1994. Dasar-dasar Ecologi. Edisi ketiga. Yogyakarta : Gadjah Mada University Press. 2. Mueller-Dombois, D. & Ellenberg, H. 1974. Aims & Methods of Vegetation Ecology. New York: Wiley & Sons. 3. Ralph, C. J., Sauer, J. R., & Droege, S. Monitoring Bird Populations by Point Counts. Berkeley: Albany. 4. Hoffmann, A., Decher, J., Rovero, F., Schaer, J., Voigt, C., Wibbelt, G. 2010. Field Methods and Techniques for Monitoring Mammals. In book: Manual on Field Recording Techniques and Protocols for All Taxa Biodiversitas Inventories and Monitoring. Abc Taxa. 5. Eekhout, X. 2010. Sampling Reptiles and Amphibians. In book: Manual on Field Recording Techniques and Protocols for All Taxa Biodiversitas Inventories and Monitoring. Abc Taxa. 6. Sheikh, A. H., Ganaie, G. A., Thomas, M. Bhandari, R., & Rather, Y. A. 2018. Ant Pitfall Trap Sampling: An Overview. J. ent. Res. Vol. 42, No. 3: 421-436</p>

Code: D10D-4008	Aquatic Ecology	Credit Point: 1.00 (1.81ECTS)
<p>The Aquatic Ecology course studies the productivity of a body of water (fresh and/or marine), including chemical, physical, and freshwater parameters. The emphasis of the course is mainly on aquatic biotas such as plankton, nekton, and benthos and their relation to physical-chemical parameters.</p>		
Lecture team	<p>1. Dr. Keukeu Kaniawati Rosada 2. Hikmat Kasmara, Drs, MS 3. Prof. Sunardi 4. Dr. rer. nat. Tri Dewi Kusumaningrum Pribadi</p>	
References	<p>1. Wetzel, R.G. 2001. Limnology: Lake and River Ecosystems. Third Edition. Academic Press 2. Dash, M. C., & Dash, S. P. (2009): Fundamentals of Ecology (3rd ed.), Tata McGraw-Hill Education Private Limited, New Delhi. 3. M. Begon, R.W. Howarth & C.R. Townsend (2014): Essentials of Ecology (4th ed). 4. Sigeer, DC. 2005. Freshwater Microbiology: Biodiversity and Dynamic Interactions of Microorganisms in the Aquatic Environment. Manchester: John Wiley & Son, Ltd.</p>	

Code: D10D-4009	Practicum Aquatic Ecology	Credit Point: 3.00 (1.81ECTS)
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The Aquatic Ecology Practicum course is a compulsory course for fourth-year students who learn how to measure physical, chemical, and biological parameters and the primary productivity of lotic and lentic ecosystems. Lentic ecosystems. After the lecture, students are expected to measure important parameters of aquatic ecosystems and see the relationship between them.	
Lecture team	<ol style="list-style-type: none"> 1. Dr. Keukeu Kaniawati Rosada 2. Hikmat Kasmara, Drs, MS 3. Prof. Sunardi 4. Dr. rer. nat. Tri Dewi Kusumaningrum Pribadi
References	<ol style="list-style-type: none"> 1. Wetzel, R.G. 2001. Limnology: Lake and River Ecosystems. Third Edition. Academic Press 2. Dash, M. C., & Dash, S. P. (2009): Fundamentals of Ecology (3rd ed.), Tata McGraw-Hill Education Private Limited, New Delhi. 3. M. Begon, R.W. Howarth & C.R. Townsend (2014): Essentials of Ecology (4th ed). 4. Sigeer, DC. 2005. Freshwater Microbiology: Biodiversity and Dynamic Interactions of Microorganisms in the Aquatic Environment. Manchester: John Wiley & Son, Ltd.

Code: D10D-4010	Biotechnology and Bioinformatics	Credit Point: 1.00 (5.43 ECTS)
Study the development of traditional and cutting-edge biotechnology. Biology/microbiology as a basic science in biotechnology, Polymerase Chain Reaction (PCR), genomic, proteomic, basics of recombinant DNA technology, cloning vectors, DNA sequencing, as well as discussing processes in metabolism as the basis of bioprocessing, the role of microbes in industry. In biotechnology, the role of microbes in industry. Types of raw materials, factors, and supporting facilities related to bioprocessing. Methods of implementing bioprocessing of various biotechnology commodities.		
Lecture team	<ol style="list-style-type: none"> 1. Prof. Dr. Ratu Safitri, MS. 2. Febri Doni, Ph.D 3. Yolani Syaputri, Ph.D 	
References	<ol style="list-style-type: none"> 1. T.A. Brown. 2016. Gene Cloning and DNA Analysis, An Introduction. Wiley-Blackwell. West Sussex, UK. 2. S.B. Primrose and R.M. Twyman. 2014. Principles of Gene Manipulation and Genomics. Blackwell Publishing. 3. William J. Thieman and Michael A. Palladino. 2013. Introduction to Biotechnology. Pearson. Boston. 4. Barh, Debmalya; Khan, Iqar Ahmad; Khan, Muhammad Sarwar. 2015. Applied molecular biotechnology: the next generation of genetic engineering. CRC Press/Taylor & Francis. London. 5. B.R. Glick, J.J Pasternak, C.L. Patten. 2017. Molecular Biotechnology Principle and Application on Recombinant DNA. 5th Edition. ASM Press. Washington D.C. 	

	6. Choudhuri, S. 2014. Bioinformatics for beginners. Academic Press. Maryland. https://doi.org/10.1016/C2012-0-07153-0
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Code: D10D-4011	Biophysics and Instrument	Credit Point: 2.00 (3.62 ECTS)
This course presents selected Physics concepts that are widely applied to solve physical problems in Biology, for 2nd year Biology students who are already familiar with basic physics concepts. This course is expected to open future insight into the importance of interdisciplinary studies and collaborating with other fields in the form of contributing to understanding and accepting contributions from other scientific disciplines.		
Lecture team	1. Prof. Dr. Eng I Made Joni, M.Sc. 2. Dr. Ayi Bahtiar, M.Si 3. Norman Syakir, M.Si 4. Ferry Faizal, PhD	
References	1. Biophysics, an Introduction, Rodney Cotterill, John Willey and Son, 2002 2. Fundamental of Biophysics, Andrey B. Rubin, Scrivener Publishing, 2014 3. An Introduction to Biomechanics, Jay D. Humphrey and Sherry L. O'Rourke Second Edition, Springer, 2015	

SEMESTER 5

BIOSCIENCES		
Code: D10D-50601	Bioprospection of Beneficial Plants	Credit Point: 2.00 (3.62 ECTS)
This course studies biodiversity and bioprospection of plants with potential as medicines, food and vegetables, aromatics and vegetable pesticides, spices and cooking spices, fibers, dyes and tannins, wood and bamboo materials, ornamental plants and those with economic value. This course also studies the grouping of plants based on chemical content (Chemotaxonomy), phytochemical profiles and secondary metabolites as well as the introduction and use of useful plants. Apart from that, several protocols related to Plant Biological Resources, Biospiration and local wisdom regarding the use of Plant SDH were also studied		
Lecture team	1. Dr. Budi Irawan, M.Si 2. Drs. Joko Kusmoro, MP 3. Dr. Mohamad Nurzaman, M.Si	
References	1. Batabyal, Amitrajeet A. and Peter Nijkamp. 2013. Biodiversity Prospecting over Time and under Uncertainty: A Theory of Sorts. TI 2013-163/VIII. Amsterdam, the Netherlands. 2. Covention on Biological Diversity. 2011. The Tkarihwaie:Ri Code of Ethical Conduct to Ensure Respect for the Cultural and Intellectual Heritage of	

	<p>Indigenous and Local Communities. Montreal, Canada: Secretariat of the CBD</p> <p>3. Gunawan, W. dan Mukhlisi. 2014. Bioprospeksi: Upaya pemanfaatan tumbuhan obat secara berkelanjutan di kawasan konservasi. Jakarta: Kementerian Lingkungan Hidup dan Kehutanan</p> <p>4. Moran, Katy, Steven R. King, and Thomas J. Carlson. 2001. "Biodiversity Prospecting: Lessons and Prospects." <i>Annual Review of Anthropology</i> 30:505–26.</p>
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BIOSCIENCES		
Code: D10D-50602	Digitalization of Biological Objects	Credit Point: 2.00 (3.62 ECTS)
<p>This course studies techniques for digitalizing animals and plants both microscopically (photomicrographs) and macroscopically. Documentation techniques are carried out on living or preserved specimens in the form of illustrations/sketches, photos, sound recordings and/or videos for scientific research purposes. Apart from that, this course studies how the results of digitalization can be presented in an information system/database so that they can be accessed by researchers, academics and the wider community in supporting the creation of digital museums and global knowledge exchange.</p>		
Lecture team	<p>1. Dr. Budi Irawan, M.Si</p> <p>2. Dr. Eneng Nunuz Rohmatullayaly, M.Si</p> <p>3. Dr. Madihah, S.Si., M.Si</p>	
References	<p>1. Bridson D and Forman L. 1992. <i>Herbarium Handbook</i>. Kew: Royal Botanic Garden</p> <p>2. Glimn-lacy J and Kaufman PB. 2006. <i>Botany Illustrated</i>. New york: Springer</p> <p>3. IBIS. 2014. <i>Indonesian Biodiversity System</i>. Bogor: Research Center For Biology, LIPI</p> <p>4. Horan A. G. 2013. <i>Digital Heritage: Digitization of Museum and Archival Collections</i>. Research papers. Paper 374. http://opensiuc.lib.siu.edu/g_s_rp/374</p> <p>5. Stow, A. 2011. <i>Digitisation of Museum Collections. A Worthwhile Effort?</i>. Graduating Thesis, BA/Sc. University Of Gothenburg: Department of Conservation.</p> <p>6. Museu Del Ter. 2020. Coneix el riu. [terhubung berkala]. https://coneixelriu.museudelter.cat/index.php. [diakses 10 Juli 2020]. Barcelona: Maleu.</p> <p>7. Google. 2020. Google Arts & Culture. [terhubung berkala]. Google Arts & Culture. [diakses 10 Juli 2020].</p> <p>8. Aguiar, J.J.M. 2017. On the use of photography in science and taxonomy: how images can provide a basis for their own authentication. <i>Bionomia</i>, 12:44-47.</p> <p>9. Nathan, T. R. 2011. Photography and Science by Kelley Wilder. <i>Visual Resources(Reviews)</i>, 27(4): 1-7</p>	

BIOSCIENCES		
Code: D10D-50603	Animal Biotechnology	Credit Point: 2.00 (3.62 ECTS)
This course studies the application of biological science and engineering using animals, especially in the fields of agriculture and health, which includes techniques for increasing livestock reproduction, techniques for increasing animal feed nutrition; application of animal cell culture in the health or therapeutic fields in livestock and humans; and technology applications for the fields of aquaculture and fisheries.		
Lecture team	<ol style="list-style-type: none"> 1. Dr. Madihah 2. Dr. Desak Made Malini 3. Dr. Yasmi P. Kuntana 	
References	<ol style="list-style-type: none"> 1. Freshney, R. I. 2010. Culture of animal cells: a manual of basic technique and Specialized Applications, 6th ed. New York: Wiley-Liss, Inc. 2. Hogan, B., Contantini, F. & Lacy, E. 1986. Manipulating the mouse embryo: a laboratory manual. New York: Cold Spring Harbor Laboratory. 3. Abubakar, M., Saeed, A., Kul, O. (2015). The Role of Biotechnology in Improvement of Livestock: Animal Health and Biotechnology. Berlin: Springer-Verlag. 4. Singh, B., Mal, G., Gautam, S.K., Mukesh, M. (2019). Advances in Animal Biotechnology. Springer. 5. Current Status and Options for Biotechnologies in Aquaculture and Fisheries in Developing Countries (https://www.fao.org/3/i2300e/i2300e04.pdf) 6. Kristanto, A.H., 2022. Domestikasi Ikan Air Tawar Asli Indonesia Mendukung Produksi Perikanan. Jakarta: Penerbit BRIN. 	

BIOSCINECES		
Code: D10D-50604	Plant Biotechnology	Credit Point: 2.00 (3.62 ECTS)
This course discusses the scope of plant biotechnology and its applications, the role of tissue culture techniques (in vitro) in propagating and improving plant characteristics, introduction to tissue culture lab facilities and aseptic techniques, basic tissue culture media, various types of culture and their benefits, production of secondary metabolites in vitro, transgenic/GMO plants and their controversies.		
Lecture team	<ol style="list-style-type: none"> 1. Dr. Mohamad Nurzaman, M.Si 2. Dr. Tia Setiawati, M.Si 3. Drs. Ruly Budiono, M.Sc. 4. Asep Zainal Mutaqin, M.Si. 	
References	<ol style="list-style-type: none"> 1. Park, S. 2021. Plant Tissue Culture Techniques and Experiments 4th Edition. Elsevier. 2. Timir Baran Dja & Biswajit Ghosh. 2005. Plant Tissue Culture : Basic and Applied. Universities Press 3. Chawla. HS. 2018. Introduction to Plant Botechnology. CRC Press. 	

	4. Agnès Ricroch, Surinder Chopra, Marcel Kuntz. 2002. Plant Biotechnology: Experience and Future Prospects. Springer.
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BIOSCIENSES		
Code: D10D-50605	Field Study	Credit Point: 2.00 (3.62 ECTS)
Field Work Lecture is one of the courses that must be taken by students in the form of observing several aspects of flora and fauna in taxonomic, ecological, and conservation terms, as well as making collections and or identification. Observations are reported in the form of a scientific report.		
Lecture team	1. Asri Peni Wulandari, Ph.D 2. Dr. Suryana, MP	
References	Lecture module	

ENVIRONMENTAL OF BIOLOGY		
Code: D10D-50606	Research Methodology of Ecology	Credit Point: 4.00 (7.24 ECTS)
The Ecological Research Methods course is a compulsory specialization course for 5th semester students (OBE-Based 2020 Curriculum). After learning the basic concepts of terrestrial ecology and aquatic ecology, in this course, students are encouraged to conduct multidisciplinary research in the field of ecology, especially in terrestrial and aquatic ecosystems, biodiversity, and ecosystem health and sustainability. The problem-based learning method directs students to gain new knowledge by analyzing various knowledge and experiences gained from case studies in the community.		
Lecture team	1. Prof. Parikesit, M,Si., Ph.D 2. Dr. Teguh Husodo, M.Si 3. Dr. rer. nat. Tri Dewi K. Pribadi 4. Dr. Susanti Withaningsih, M.Si 5. Dr. Keukeu Kaniawati, M.Si 6. Dr. Indri Wulandari, M.I.L 7. Nurullia Fitriani, S.Si, MT	
References	1. Canadell et al. Ecological Studies: Analysis and Synthesis. Springer 2. Henderson, P.A. Practical Methods in Ecology. 2009. Wiley-Blackwell 3. Henderson, P.A. and Southwood. Ecological Methods, 4th Edition. 2016. Wiley-Blackwell	

ENVIRONMENTAL OF BIOLOGY		
Code: D10D-50607	Tropical Biodiversity	Credit Point: 2.00 (3.62 ECTS)
In the biodiversity course, students of the undergraduate Biology study program will be given the material on the understanding of biodiversity, why biodiversity is very important for national development activities and the life of living things as a whole.		

<p>Various aspects of biodiversity including the context of natural ecosystems and built ecosystems, including biodiversity between the two types of ecosystems. In addition, in this course students will be given material related to aspects of biodiversity conservation, including those concerning conservation strategies for rare and protected animals.</p>	
<p>Lecture team</p>	<ol style="list-style-type: none"> 1. Prof. Parikesit, M,Sc., Ph.D 2. Prof. Dr.Wawan Hermawan, M.Sc. 3. Prof. Johan Iskandar, M.Sc., Ph.D. 4. Prof. Dr. Erri N Megantara 5. Drs. Hikmat Kasmara, M.Si. 6. Dr. Susanti Withaningsih, M.Si.
<p>References</p>	<ol style="list-style-type: none"> 1. Edward.O.Wilson. 1992. The Diversity of Life. W.W. Norton & Company. 2. Fahrig, L. 2003. Effect of Habitat Fragmentation on Biodiversity. <i>Ann. Rev. Ecol.Evol.Syst.</i> 34:487-515. 3. Ines Omann, Andrea Stocker, Jill Jager. 2009. Climate Changes as a Threat to Biodiversity : An Application of the DPSIR Approach. <i>Ecological Economics.</i> Elsevier. 4. Jocelyn F, Jacques L, Paul C, Max D , Pascal M. 2010. Managing Agricultural Change for Biodiversity Conservation in a Mediterranean upland. <i>Biological Conservation.</i> Elsevier. 5. Joshua J Lawler. 2009. Climate Change Adaptation Strategies for Resources Management and Conservation Planning. <i>The Year in Ecology and Conservation Biology.</i> New York Academy of Sciences.

<p>ENVIRONMENTAL OF BIOLOGY</p>		
<p>Code: D10D-50608</p>	<p>Human Ecology</p>	<p>Credit Point: 2.00 (3.62 ECTS)</p>
<p>Human Biology is an elective course that focuses on how humans live in biological systems that process resources to realize their aspirations. This course studies human variation, adaptation, and evolution through human evolution, growth and development (body size, shape, composition, and sexual maturation), aging and reproductive senescence, social behavior, socio-ecological environments/biocultural variation, and how we have evolved by developing a life history strategy.</p>		
<p>Lecture team</p>	<ol style="list-style-type: none"> 1. Dr. Eneng Nunuz Rohmatullayaly, M.Si 2. Annisa, Ph.D 	
<p>References</p>	<ol style="list-style-type: none"> 1. Chiras, D. D. (2013). Human biology. Jones & Bartlett Publishers. 2. Ellison, P. T. (2017). Reproductive ecology and human evolution. Routledge. 3. Eveleth, P. B., Tanner, J. M., Eveleth, P. B., Tanner, J. M., & Chang, W. H. (1976). Worldwide variation in human growth (Vol. 8). CUP Archive 4. Mai, L. L., Young Owl, M., & Kersting, M. P. (2005). The Cambridge dictionary of human 	

	biology and evolution (No. Sirsi) i9780521662505). 5. Stinson, S., Bogin, B., & O'Rourke, D. H. (Eds.). (2012). Human biology: an evolutionary and biocultural perspective. John Wiley & Sons
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MICROBIOLOGY		
Code: D10D-50609	Environmental Microbiology	Credit Point: 4.00 (7.24 ECTS)
<p>This course is a compulsory theory course as a continuation of Basic Microbiology by discussing the application of microbiology to the environment. to the environment. At the end of this lecture students are expected to be able to: recognize the scope of the field of environmental management in the field of microbiology, identify characteristics and environmental factors (water, soil, and air) and their specific types of microorganisms; describe the characteristics of environmental pollution and explain microbial interactions in changes in environmental quality; and be able to choose in changes in environmental quality; and be able to select appropriate methods for specific environmental quality analysis. Materials provided given is about the ecology and diversity of microorganisms, especially in soil, water, and air; biology of microorganisms, especially in soil, water, and air. in soil, water, and air; environmental bioremediation; environmental quality standards and water treatment systems involving methods of quality standards and water treatment systems involving microbiological methods; and microbiological methods; and air pollution investigation methods.</p>		
Lecture team	1. Dr. Nia Rossiana 2. Prof. Ratu Safitri 3. Asri Peni Wulandari, Ph.D 4. Dr. Keukeu K. R 5. Dr. Mia Miranti	
References	Introduction to Environmental Microbiology Publisher: Oficyna Wydawnicza Politechniki Wrocławskiej. Editor: Oficyna Wydawnicza Politechniki Wrocławskiej, ISBN: 83-7085-880-5. Barbara Kolwzan.	

MICROBIOLOGY		
Code: D10D-506010	Industrial and Applied Microbiology	Credit Point: 4.00 (7.24 ECTS)
<p>The Applied Microbiology course is a compulsory specialization course for 5th-semester students (OBE-Based 2020 Curriculum). After studying the basic concepts of fermentation and its analysis process, as well as its application in various fields. The problem-based learning method will direct students to gain new knowledge by analyzing various knowledge and learning experiences they have, and connecting them with learning problems given in the form of cases. Students will learn the steps to find a solution to the given case. The recommendations proposed then with scientific stages students will design and manufacture fermentation-based products. At the end of the lecture, the achievement is tested in the form of output in the form of fermentation products.</p>		
Lecture team	1. Prof. Dr. Ratu safitri	

	2. Asri Peni Wulandari Ph.D 3. Yolani Ph.D
References	1. Waites, Michael J. Industrial Microbiology: An introduction. Blackweel Science. 1st publ. 2001 T.J. International Ltd, Padstow, Cornwall 2. Sanjai Saxena. Applied Microbiology (e-book). Springer. India. 2015

SEMESTER 7

Code: D10D-XX00	Compulsory Courses in the Field of Specialization***	Totally Credit Point: 4.00 (7.24 ECTS)
Lecture team	Lecturer for elective courses	
References	depending on the course	

Code: D10D-5006	Project Proposal Seminar	Credit Point: 1.00 (1.81 ECTS)
The project proposal seminar is the initial stage for students to conduct Final Project research. In this course, students are prepared to prepare a research plan in the form of a proposal until they are able to present it. The assessment material includes components: (Proposal Seminar Project assessment form). The lecturers who teach this course will be managed directly by their respective supervisors.		
Lecture team	1. Supervisor 2. Seminar 2 Examiner 3. Seminar Coordinator	
References	1. Patton, M. Q. (2002). Qualitative Evaluation and Research Methods. California: Sage Publications 2. Yin, Robert K. (2011). Qualitative Research from Start to Finish. New York: Guildford Press. 3. Spradley, Hourses. (1980). Participant Observation. Holt Rinehart and Winston. 4. W. Alex Edmonds, T. D. (2013). An Applied Reference Guide to Research Designs: Quantitative, Qualitative, and Mixed Methods. Thousand Oaks, CA: Sage Publications, Inc 5. Borg, W.R., & Gall, M.G. (1989). Educational Research: An Introduction (5th ed.). New York: Longman	

SEMESTER 8

Code: D10D-8301	Seminar 2	Credit Point: 1.00 (1.81 ECTS)
Result Seminar Project is the advanced stage for students in conducting Final Project research before the Bachelor Session. In this seminar, students present the results of the research that has been done in the final project research. The assessment material includes presentation, writing procedures, and competence in the field of study.		

Lecture team	<ol style="list-style-type: none"> 1. Head of Biologi Study Program 2. Supervisor thesis 3. Seminar 2 Examiner
References	<ol style="list-style-type: none"> 1. Patton, M. Q. (2002). Qualitative Evaluation and Research Methods. California: Sage Publications 2. Yin, Robert K. (2011). Qualitative Research from Start to Finish. New York: Guildford Press. 3. Spradley, Hourses. (1980). Participant Observation. Holt Rinehart and Winston. 4. W. Alex Edmonds, T. D. (2013). An Applied Reference Guide to Research Designs: Quantitative, Qualitative, and Mixed Methods. Thousand Oaks, CA: Sage Publications, Inc 5. Borg, W.R., & Gall, M.G. (1989). Educational Research: An Introduction (5th ed.). New York: Longman

Code: D10D-8302	Thesis of Undergraduate Program	Credit Point: 5.00 (9.05 ECTS)
<p>Thesis course is a learning process to produce theses and journal manuscripts as scientific work based on work results from conducting research or design work on the application of technology within the scope of biological and environmental resource management. The learning process takes the form of a problem or topic in the form of a research project which is presented systematically and comprehensively, complemented by literature study, and contains elements of analysis and synthesis under the guidance of the supervisor.</p>		
Lecture team	<ol style="list-style-type: none"> 1. Head of Biology study program 2. Supervisor 	
References	<ol style="list-style-type: none"> 1. Biology Study Program Academic Handbook 2. Reference Book for Thesis Preparation Link_PADJADJARAN UNIVERSITY RECTOR'S DECREE Number: 1391/H6.1/KEP/PP/2011. (Unpad) 	

Code: D10D-8303	Undergraduate Thesis Examination	Credit Point: 1.00 (1.81 ECTS)
<p>The final learning process that students majoring in Biology must take is a Comprehensive Examination and a thesis material examination. Through this course students will have time to prepare undergraduate sessions in a structured manner with learning experiences in the form of: reviewing material in the basic fields of biology, applied, or in relation to other scientific disciplines; by explaining with a systematic, clear and constructive delivery pattern.</p>		
Lecture team	<ol style="list-style-type: none"> 1. Head of Biology study program 2. Supervisor 3. Thesis Examiner 	
References	<ol style="list-style-type: none"> 1. Biology Study Program Academic Handbook 2. Reference Book for Thesis Preparation Link_PADJADJARAN UNIVERSITY RECTOR'S DECREE Number: 1391/H6.1/KEP/PP/2011. (Unpad) 	

3.6 Supervision Role

In the process of preparing a Bachelor's Thesis—or during the research and writing of the research report—each student is supervised by two lecturers, namely **Supervisor 1 (Main Supervisor)** and **Supervisor 2 (Co-Supervisor)**.

1. Appointment of Supervisors

1. Supervisor 1 (Main Supervisor)

- Appointed based on mutual agreement between the student and the lecturer, formalized through an *Assignment Letter* issued by the Program Coordinator.
- If a student experiences difficulty in selecting a potential main supervisor, the Program Coordinator has the authority to appoint one.

2. Supervisor 2 (Co-Supervisor)

- Appointed directly by the Program Coordinator based on the relevance of expertise to the student's research topic.

2. Roles and Responsibilities of Supervisors

a. Supervisor 1 (Main Supervisor)

- Guides the student in all aspects related to the thesis, including:
 - Determining the research focus,
 - Designing the research methodology,
 - Selecting relevant theories,
 - Ensuring proper academic writing.
- Responsible for approving revisions from the proposal seminar.
- Students may register for the proposal seminar only after the thesis manuscript has been approved by Supervisor 1.

b. Supervisor 2 (Co-Supervisor)

- Assists Supervisor 1 in the entire thesis supervision process, during both the research and writing stages.
- Provides input throughout the completion of the thesis.
- Guides students in academic writing style, formatting, and administrative completeness of the thesis.

3. Thesis Revision

Revisions to the thesis after the defense must be approved by all examiners, under the following conditions:

- a. **Supervisor 1:** Reviews and approves the research focus and overall format.
- b. **Supervisor 2:** Reviews and approves the methodology, academic writing, and thesis formatting.
- c. **Examiners:** Review and approve the methods, theories, and analysis.
- d. **Chair of the Examination Board:** Ensures that all approvals from supervisors and examiners are complete.
- e. **Secretary of the Examination Board:** Ensures that the revisions match the notes from the defense.

4. Supervisor Requirements

a. Requirements for Supervisor 1 (Main Supervisor)

1. Must be a permanent lecturer in the Bachelor of Biology Program.
2. Holds a minimum academic position of *Lektor* (Senior Lecturer) with a Doctoral (Ph.D.) degree or equivalent.
3. If the number of eligible lecturers is insufficient, the program may appoint a permanent lecturer from another study program within the same scientific field.
4. Selected based on expertise and research interest relevant to the student's research area.

b. Requirements for Supervisor 2 (Co-Supervisor)

1. Must be a permanent lecturer in the Bachelor of Biology Program.
2. Holds a minimum position of *Assistant Expert (Asisten Ahli)* with a Doctoral (Ph.D.) degree.
3. May also be a lecturer from an accredited national university equivalent to Universitas Padjadjaran, or an international university with at least equivalent reputation, holding a minimum rank of *Lektor* (Senior Lecturer) and a Doctoral qualification, selected based on their scientific specialization and/or
4. An expert or practitioner from Indonesia or abroad, recognized for specialized expertise equivalent to Indonesian National Qualification Framework (KKNI) Level 9.
5. Selected based on expertise and research interest relevant to the student's study.

5. Duties and Obligations of Supervisors

a. Supervisor 1 (Main Supervisor)

1. Assists the student in determining the research problem.
2. Guides the implementation of research and thesis preparation.
3. Supervises the academic writing of the entire thesis.

b. Supervisor 2 (Co-Supervisor)

1. Assists Supervisor 1 in the thesis supervision process.
2. Supports the student during the research phase.
3. Provides feedback during thesis preparation.
4. Guides the student on academic writing format, citation style, and administrative requirements.

6. Replacement of Supervisors or Supervised Students

- If a permanent impediment prevents a lecturer or student from carrying out supervision for two consecutive semesters, the concerned party may report the issue verbally to the Program Coordinator.
- The Program will verify and evaluate the issue.
- If approved, the lecturer or student may submit a written request clearly stating the reason for replacement.
- If the request is denied, the supervision continues with the original supervisor arrangement.
- If approved, the Program will appoint a new supervisor and issue a new *Supervision Assignment Letter*.

CHAPTER 5: SOURCES AND FACILITIES

4.1 Lecturers And Areas Of Specialization

The resources that are owned and involved in learning activities can be divided into three groups of interest (research group/working group), namely Bioscience, Microbiology, and Environmental Biology. Each lecturer involved in interest group has the potential to develop funding facilities to support two types of independent learning programs, especially in the fields of research and community service in the form of KKN-thematic.

In its implementation, each expertise group is led by head of the field of interest to build a scientific road that can be developed to become the basis of learning and partnership plans both at home and abroad.

4.2 Lecture Room

Teaching and learning activities in the Biology Study Program, Faculty of Mathematics and Natural Sciences (FMIPA), Padjadjaran University are supported by lecture hall facilities which are usually held in 2 (two) buildings, namely the PPBS Building and D6 Building. Study room facilities are also equipped with a system equipped with hybrid learning methods. The workplace or Student Common Room for the Bachelor Program of Biology is in building D2 and Building 6 which has been equipped with facilities and infrastructure intended to support the teaching and learning process so that it can run optimally. The facilities in question are lecture rooms and their equipment (student chairs and desks, as well as learning media in the form of audio-visual devices), as well as laboratories that are integrated with the Department of Biology and FMIPA.

4.3 Practicum Room

Academic support facilities for practicum and research are:

- Taxonomy Laboratory (in Building D2)
- Molecular Biology laboratory (in Building D2)
- Biosystems Laboratory (in Building D2)
- Environmental Biology Laboratory (in Building D2)
- Microbiology Laboratory (in Building D6)

4.4 Lecturer Rooms, Secretariat, Seminar Room

Lecturer room, secretariat of Bachelor Program of Biology, seminar / session, and room located in Building D2, which is located across from the Dean's Building of FMIPA.

4.5 Library

The service of providing books and thesis documents is provided in Cisral, Faculty, and Department of Biology libraries. Students of the Bachelor Program of Biology can also take advantage of the infrastructure/facilities managed by the Faculty

of Mathematics and Natural Sciences in the form of libraries and discussion rooms, as well as computer laboratories. The need for libraries is also available in the form of textbooks, scientific papers, and journals both in printed form (hard copy) and in electronic form (CD-ROM form and other media), which are available both in the FMIPA library and the university's central library.

4.6 Internet Facilities

To support the teaching and learning process, the Bachelor Program of Biology facilitates student access to internet facilities by using the internet wireless connection (WiFi) facility provided by the University with a bandwidth capacity of up to 3 Gbps for 24 hours which can be used by the academic community of the Biology Masters Study Program to access academic information and various electronic publications such as e-journals using the Pope ID owned by each student.

4.7 Service Support Infrastructure

Himbio Unpad, place of worship, sports facilities, canteen, photocopy, Arboretum, laboratories, LCD-equipped lecture rooms, and ICT (Information and Communication Technology facilities).