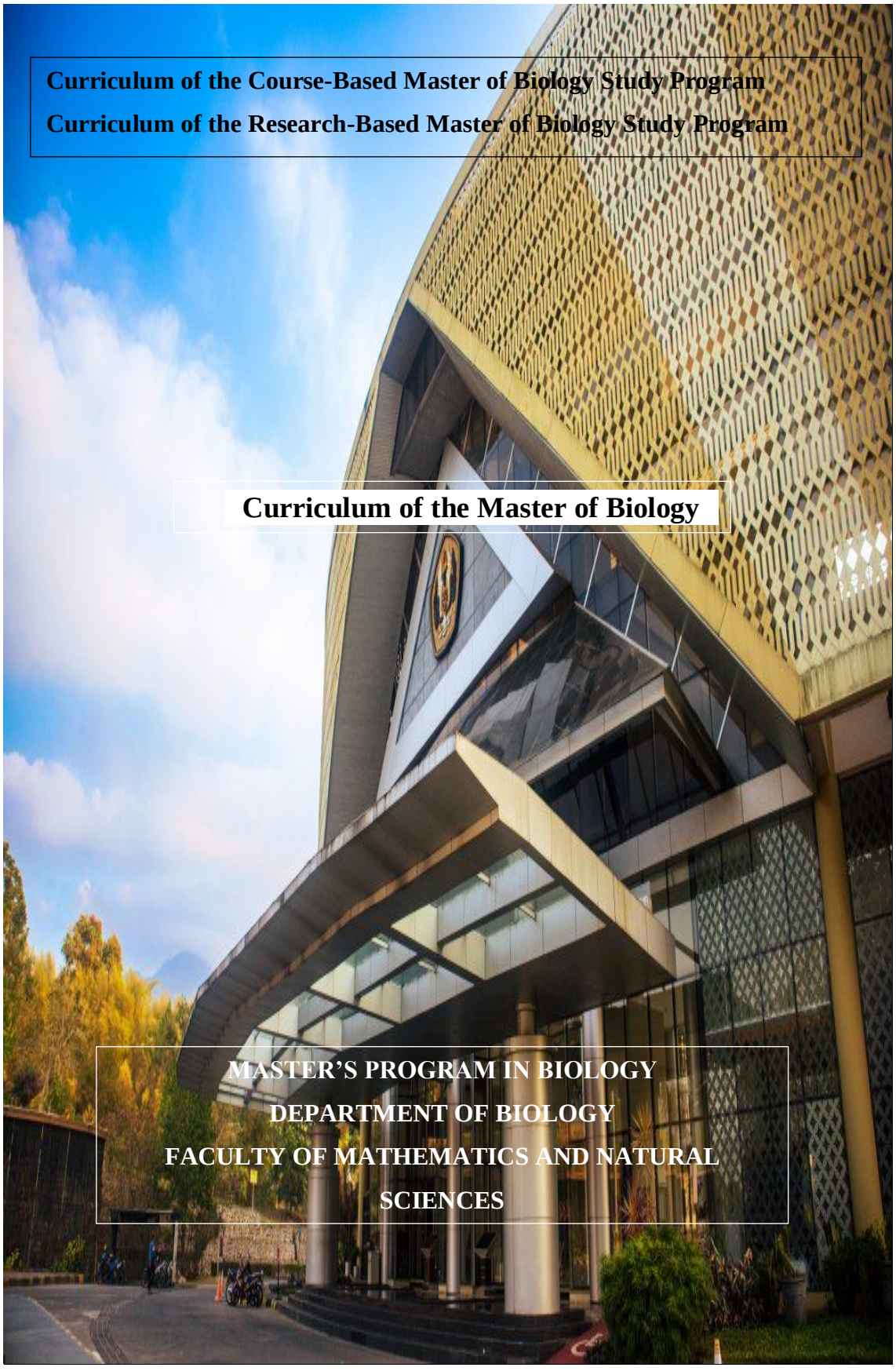

Curriculum of the Course-Based Master of Biology Study Program

Curriculum of the Research-Based Master of Biology Study Program

Curriculum of the Master of Biology

MASTER'S PROGRAM IN BIOLOGY

DEPARTMENT OF BIOLOGY

FACULTY OF MATHEMATICS AND NATURAL SCIENCES

PREFACE

The curriculum plays a vital role in any learning program and therefore must be designed, established, implemented, and evaluated dynamically. This continuous adjustment aims to respond to the developments of the times, the needs of Science, Technology, and Arts (IPTEKS), as well as the competencies required by society and graduate users. This evolution is reflected in the changes to the National Higher Education Standards (SN-Dikti) regulations over the past decade, including Ministerial Regulations (Permenristekdikti) No. 44 of 2015, No. 49 of 2014, and most recently, the Minister of Education, Culture, Research, and Technology Regulation (Permendikbudristek) No. 53 of 2023. Based on this latter regulation, the 2025 Curriculum for the Biology Master's Program was initially developed by adopting an Outcome-Based Education (OBE) approach and the Indonesian National Qualifications Framework (KKNI), which is oriented towards Graduate Learning Outcomes (Capaian Pembelajaran Lulusan - CPL).

The Master of Biology Study Program subsequently adjusted its curriculum to comply with Permendiktisaintek No. 39 of 2025, which replaced Permendikbudristek No. 53 of 2023 as of September 2, 2025. This adjustment resulted in a study load of 54 credits for a study period of 3-4 semesters, which adheres to the new regulation's minimum requirements and reflects a commitment to continuous improvement. This comprehensive curriculum revision encompasses changes to the Program's Vision, Mission, Goals, Strategy, Graduate Profiles, and nationally and internationally benchmarked Graduate Learning Outcomes (CPL). These fundamental changes have led to adjustments in course learning outcomes, teaching methods, and the distribution of courses between the Coursework and Research Tracks. This curriculum, officially enacted under Dean's Decree No. 654a/UN6.D/Kep/FMIPA/2025 and effective from Semester I of the 2025/2026 Academic Year, was prepared with the participation of various parties, to whom the Master's Program Curriculum Team extends its gratitude.

Jatinangor October 2025

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CHAPTER I

History, Vision, Mission, Objectives, and Strategies of the Study Program

1.1 History

The Biology Study Program is one of the postgraduate programs under the Faculty of Mathematics and Natural Sciences, Universitas Padjadjaran. The Master's Program in Biology was officially established through the Decree of the Minister of Education and Culture of the Republic of Indonesia No. 108/P/2014 concerning the authorization for the establishment of new study programs at Universitas Padjadjaran, Bandung. Academic activities of the Master's Program in Biology commenced on March 10, 2014, the date on which the decree was issued.

The Master's Program (S2) in Biology plays a strategic role in producing graduates who are competent in both theoretical and applied biology and who are able to contribute to the advancement of science and technology. Alongside the continuous development of science, technology, and labor market demands, the curriculum must be periodically evaluated to ensure its alignment with contemporary developments, national policies, and higher education quality standards, such as the Indonesian National Qualifications Framework (KKNI) and the National Standards for Higher Education (SN-Dikti).

Curriculum evaluation constitutes an integral part of efforts to enhance academic quality and the relevance of higher education. Moreover, such evaluation represents an academic and institutional accountability to stakeholders, including students, lecturers, alumni, industry, and society at large. The results of this evaluation are expected to serve as the basis for curriculum review and development, making it more adaptive and responsive to both global and local challenges.

1.2 Vision and Mission of the Study Program

The vision of the Master's Program in Biology is: *"To become an excellent and competitive Master's Program in Biology in delivering education in the field of biological resource and environmental management at the international level."*

The missions of the Master's Program in Biology are as follows:

a) To provide education that produces graduates who are adaptive and nationally competitive in the management of biological resources.
b) To conduct high-quality research on biological resource management that supports the learning process, education, and benefits society.
c) To establish research collaborations on biological resources with national and international educational institutions, government bodies, and industry.
d) To implement academic governance that enhances curriculum quality in a sustainable manner to meet stakeholders' needs through the implementation of the *Tridharma of Higher Education*.
e) To develop competent human resources who uphold bioethics in the sustainable management of biological resources.

1.3 Objectives of the Master's Program in Biology (2025–2029)

The objectives of the Master's Program in Biology are as follows:

(a) To produce graduates who are able to apply biological sciences professionally with a religious, independent, ethical, and communicative attitude, upholding local culture, and mastering the latest technologies to compete at both national and international levels.
(b) To produce graduates who are capable of applying biological concepts, generating excellent research and innovations, integrating advances in contemporary science, and contributing to solving problems related to the management of biological resources and the environment through interdisciplinary and transdisciplinary approaches, with positive and beneficial impacts on society.
(c) To produce graduates with the knowledge and expertise to pursue further studies or to develop professional careers in the fields of Biology, Biological Resource and Environmental Management, as well as related scientific disciplines.

1.4 Strategies for Achieving the Study Program's Vision, Mission, and Objectives

The strategies for achieving the vision, mission, and objectives of the Master's Program in Biology are as follows:

1. **Strengthening the curriculum and competency-based learning aligned with the Indonesian National Qualifications Framework (KKNI).**

(a) Developing a curriculum that integrates modern biological concepts, the latest technologies, interdisciplinary approaches, and character values through active and collaborative learning that supports soft skills development.
(b) Designing and updating an outcome-based curriculum (OBE) aligned with graduate learning outcomes (CPL) and ASIIN accreditation criteria.
(c) Implementing project-based learning (PBL), case studies, and interdisciplinary discussions to enhance analytical and problem-solving skills.
(d) Enhancing the use of digital technologies (e-learning, simulations, and virtual laboratories) to expand access to up-to-date knowledge.
(e) Developing an adaptive curriculum that is responsive to academic and labor market needs.

2. **Enhancing research capacity and innovation.**
   (a) Developing leading, relevant, and collaborative research themes aligned with national and global priorities.
   (b) Expanding multidisciplinary and transdisciplinary research facilities, publications, and dissemination of research outcomes at national and international levels.
   (c) Encouraging students and lecturers to publish in reputable journals, participate in international conferences, and register intellectual property rights (patents, IPR) for research outputs.

3. **Strengthening networks and collaboration.**

   (a) Expanding national and international collaborations through joint research, co-publications, and student exchanges.
   (b) Increasing stakeholder engagement through collaborations with alumni, NGOs, industry partners, and governmental or private institutions.
   (c) Developing character and leadership skills, and encouraging graduates to be well-prepared for further studies and professional careers.
   (d) Involving alumni or professionals as mentors to guide students in career development or further education.

4. **Integrating religious values, local culture, and competencies.**

   (a) Organizing seminars or workshops on academic ethics, local wisdom, environmental awareness, and social responsibility.

(b) Conducting community service activities, including training programs on environmental management for local communities.
(c) Enhancing practical skills and specialization through advanced practicums, internships, workshops, or fieldwork in partner institutions.
(d) Expanding opportunities for engagement in professional projects.

5. **Continuous evaluation and monitoring through a quality assurance system.**

(a) Optimizing the Excellent Accreditation status and ASIIN international accreditation as the foundation for continuous quality improvement.
(b) Conducting regular evaluations of the curriculum, learning methods, and graduate outcomes (alumni tracking).
(c) Ensuring the program remains nationally and internationally recognized.
(d) Implementing tracer studies and ongoing evaluations to identify competency needs from alumni and graduate users.

6. **Promotion and social impact.**

(a) Promoting the Study Program through academic and non-academic media, open house events, and showcasing achievements and community service activities to increase prospective students' interest in the Master's Program in Biology.

CHAPTER II

GRADUATE PROFILE AND LEARNING OUTCOMES

2.1 Graduate Profile of the Master's Program in Biology

Ministerial Regulation No. 3 of 2020 on the National Standards for Higher Education (SNPT) and the Indonesian National Qualifications Framework (KKNI, Presidential Regulation No. 8/2012) serves as the reference for the curriculum of the Master's Program in Biology at Universitas Padjadjaran, designed to produce graduates with competencies at KKNI Level 8. The curriculum is developed based on Outcome-Based Education (OBE) with a Student-Centered Learning (SCL) approach, including Problem-Based Learning (PBL), Project-Based Learning (PjBL), and Research-Based Learning (RBL), while utilizing Unpad's digital LiVE facilities. The competency standards encompass four aspects: attitudes, knowledge, general skills, and specific skills, in alignment with industry needs, the Indonesian Biology Consortium (KOBI) guidelines, and international accreditation standards such as ASIIN. The ultimate goal is to produce graduates capable of contributing to the sustainable management of biological and environmental resources.

The graduate profile represents a general description of the roles and core competencies expected of graduates upon completion of the Master's Program in Biology. Its formulation refers to the vision and mission of the program, societal needs, the advancement of science and technology, as well as input from stakeholders, including industry, academia, and research institutions. Graduates of the Master's Program in Biology, Faculty of Mathematics and Natural Sciences, Universitas Padjadjaran, are expected to possess up-to-date knowledge, critical thinking ability, ethical awareness, professionalism, and a commitment to lifelong learning. They are also capable of designing innovative research in the management of biological and environmental resources, particularly in the fields of Ecology integrated with Biosystems and Biodiversity, as well as the Application of Microbiology and Microbial Biotechnology. These competencies are developed through multi- and interdisciplinary approaches to advance science and technology for the benefit of society. In general, the graduate profiles of the Master's Program in Biology can be grouped into four categories of competencies: (1) Academics, university lecturers, or academic staff; (2) Researchers, surveyors, or consultants in the fields of environment and biological/natural resources; (3) Professionals or engineers in industry/companies; and (4) Entrepreneurs, as well as those continuing to higher levels of study. This graduate profile is aligned with the competency

standards equivalent to Level 8 of the KKNI, in accordance with Ministerial Regulation No. 50 of 2018 on the Amendment to Ministerial Regulation No. 44 of 2015 concerning the National Standards for Higher Education, as well as the learning outcomes formulated by professional organizations/associations, namely the Indonesian Biology Consortium (KOBI) and the Indonesian Biological Society.

Based on the competency level standards equivalent to Level 8 of the Indonesian National Qualifications Framework (KKNI), the graduate profile of the Master's Program in Biology can be described as follows:

Table 2.1 Description of Graduate Profiles of the Master's Program in Biology

No	Profile	Description
1	Academics, lecturers, or university staff	Graduates possess the capacity to carry out the *Tri Dharma of Higher Education*, namely education, research, and community service, thereby being well-prepared for careers as lecturers, instructors, or mentors within the academic environment.
2	Researchers/ Surveyors/ Consultants in the fields of environment and biological/natural resources	Graduates are capable of designing and conducting independent or collaborative research, and of carrying out innovative studies in ecology, biosystem biodiversity, natural conservation, management of natural and environmental resources, as well as microbial applications in various fields such as bioremediation, agriculture, environment, health, industry, microbial bioprospecting, and biotechnology. They are able to analyze biological and molecular data and apply bioengineering techniques. Graduates can communicate scientific ideas and research outputs both orally and in writing, produce high-quality scientific works, and develop innovative and creative research that contributes to the advancement of science and benefits society.
3	Professionals or engineers in industry/companies; Entrepreneurs	Graduates have expertise in planning, managing, and conserving natural resources (both biotic and abiotic) and the environment in a sustainable manner through scientific, ethical, and legal approaches. They are also able to establish and develop innovative businesses based on natural resources, combining entrepreneurial principles (profit) with ecological and social sustainability (*eco-entrepreneurship* or *green entrepreneurship*).
4	Continuing education to a higher level	Graduates master fundamental principles of ecology, biodiversity, conservation, climate change, and environmental policy. They are skilled in processing environmental data (statistics, GIS, remote sensing) using tools such as R, Python,

No	Profile	Description
		or ArcGIS, and in designing field or laboratory research. They are capable of critically reviewing international journals and writing scientific papers with rigorous methodology. They possess knowledge in renewable energy, bioremediation, and waste management systems, and understand regulations such as Environmental Impact Assessment (EIA/AMDAL), land use planning, environmental impact evaluation, and ecosystem conservation. Graduates are able to design creative solutions to issues such as climate change and its mitigation, deforestation, pollution, or resource conflicts. They are also capable of working in teams, adapting to environmental conditions, designing research, writing journal articles, and applying for research funding.

Overall, the graduate profiles of the Master's Program in Biology are aligned with both national and global needs, and support efforts to enhance the nation's competitiveness through the development of competent, adaptive, and professional human resources in the management of natural and environmental resources.

The Master's Program in Biology offers two educational tracks, namely the coursework-based master's program and the research-based master's program. For the coursework-based master's track, students are required to complete 24 credits of compulsory courses and 12 credits of elective courses (equivalent to four courses). In addition, there are 18 credits allocated to thesis-related courses, consisting of Research Proposal Seminar (3 credits), Research Progress Seminar (6 credits), and Master's Final Examination (9 credits).

The research-based master's track (Master by Research) is specifically designed to produce graduates with excellent research competencies who are able to compete at the international level. Students in this track must complete a minimum of 24 credits of research-based master's competencies, with a maximum of 12 credits allocated to coursework, while the remaining credits are directed towards research activities and thesis development. In addition to mastering core subjects, students are encouraged to develop research skills, scientific dissemination, and personal development. The strengthening of these competencies may be achieved through participation in national or international scientific seminars as presenters, conducting systematic and in-depth literature reviews or journal readings, as well as serving as teaching assistants to support the teaching–learning process and broaden academic perspectives.

Through this research-based track, students are expected to produce scientific works that can be published in reputable journals and build professional networks at both national and international levels. The competencies of the graduates of the Master's Program in Biology, which encompass attitudes, knowledge, general skills, and specific skills, are presented in Table 2.2.

Table 2.2 Competencies of Graduates of the Master's Program in Biology

Competency in Attitudes	
S1	Upholding human values in carrying out tasks based on religion, morality, and ethics, as well as adhering to laws and discipline in social and national life.
S2	Demonstrating religious, moral, and normative attitudes, capable of internalizing academic values and ethics, while exhibiting independence, responsibility, excellence, scientific rigor, professionalism, encouragement, creativity, and trust (RESPECT), and upholding human values and life.
Competency in Knowledge	
P1	Ability to conduct analysis based on advanced knowledge of biology, related sciences, or interdisciplinary fields that form the subject of research.
P2	Ability to determine appropriate research methods, employ advanced technology for the analysis of biological resources, and apply biodiversity concepts in sustainable resource and environmental management.
Competency in General Skills	
KU1	Developing logical, critical, systematic, and creative thinking through scientific research and design in the fields of science and technology, integrating humanities values, and producing theses or scientific works published in accredited or international journals.
KU2	Acquiring the skills and qualifications necessary to work in academic, governmental, or private sectors related to life sciences.
Competency in Specific Skills	
KK1	Ability to advance biological science and/or technology by producing accurate, tested, and innovative models or methods with potential applications in various fields.
KK2	Ability to develop solutions to issues related to biology, climate change, and the management of biological and environmental resources, articulated in scientific works.
KK3	Ability to contribute to addressing issues of climate change and global warming that impact biodiversity and the environment.

2.2 **Graduate Learning Outcomes**

The Graduate Learning Outcomes (CPL) of the Master's Program in Biology are formulated based on the graduate profile, meeting KKNI Level 8 (Ministerial Regulation 53/2023), European Qualification Framework (EQF) Level 7, ASIIN Subject-Specific Competence standards, and the criteria of KOBI and PBI, in accordance with the National Standards for Higher Education. The detailed Graduate Learning Outcomes (CPL) of the Master's Program in Biology are presented in Table 2.3.

Table 2.3 Graduate Learning Outcomes (CPL) of the Master's Program in Biology

Code	CPL Description
CPL1/LO	Demonstrates a religious attitude and the principles of RESPECT (Responsible, Excellent, Scientific Rigor, Professional, Encouraging, Creative, and Trust); possesses a scientific character to produce scholarly works in accordance with research ethics for accredited/international journals while upholding human values and life.
CPL2/LO	Masters biology holistically from the cellular to the biosphere level and applies advanced technologies for the sustainable management of biological and environmental resources based on biodiversity principles that support the Sustainable Development Goals (SDGs).
CPL3/LO	Ability to apply measurement principles and concepts using advanced technological instruments for the analysis and synthesis of biological resources.
CPL4/LO	Acquires the skills and qualifications necessary to work in academic, governmental, or private sectors in the management of biological and environmental resources.
CPL5/LO	Able to deepen and advance biological knowledge through the creation of accurate, tested, and innovative multidisciplinary models, methods, or theories as solutions for the management of biological and environmental resources.
CPL6/LO	Ability to manage and actively contribute to addressing climate change and global warming issues related to biodiversity and the environment.
CPL7/LO	Possesses expertise in planning, managing, and conserving natural resources and the environment in a sustainable manner, while adhering to the principles of lifelong learning.

The relationship between the graduate competency profile, consisting of attitudes (S), knowledge (P), general skills (KU), and specific skills (KK), and the Graduate Learning Outcomes (CPL/LO) of the Master's Program in Biology is presented in Table 2.4.

Table 2.4 Mapping of Graduate Competencies to Learning Outcomes (LO) of the Master's Program in Biology

Code	S1	S2	P1	P2	KU1	KU2	KK1	KK2	KK3
CPL1	√	√			√				
CPL2			√	√			√	√	
CPL3				√		√	√	√	√
CPL4					√	√	√	√	
CPL5				√		√	√	√	√
CPL6	√				√			√	√
CPL7		√	√					√	√

2.3 **Mapping of CPL to Graduate Profile**

The following matrix presents the mapping of Graduate Learning Outcomes (CPL) to the graduate profile of the Master's Program in Biology.

Table 2.5 Mapping Matrix of CPL to Graduate Profile of the Master's Program in Biology

PROFILE	LEARNING OUTCOMES (CPL)	CPL ELEMENTS DESCRIPTION
Academics	CPL1, CPL2, CPL3, CPL4, CPL5, CPL7	S1, S2, P1, P2, KU1, KU2, KK1, KK2, KK3
Researcher	CPL1, CPL2, CPL3, CPL5, CPL6, CPL7	S1, S2, P1, P2, KU2, KK1, KK2, KK3
Professional/Practitioner/ Entrepreneur	CPL3, CPL4, CPL5, CPL6	S1, P2, KU1, KU2, KK1, KK2, KK3
Continuing to PhD Studies	CPL1, CPL2, CPL3, CPL4, CPL5, CPL6, CPL7	S1, S2, P1, P2, KU1, KU2, KK1, KK2, KK3

2.3.1 Relationship between Program Educational Objectives (PEO) and CPL

The alignment of CPL with the Program Educational Objectives (PEO) is presented in the following table:

Table 2.6 Matrix of CPL Alignment with Program Educational Objectives (PEO)

PROGRAM EDUCATIONAL OBJECTIVES (PEO)	CPL1	CPL2	CPL3	CPL4	CPL5	CPL6	CPL7
PEO1	√	√	√	√			
PEO2		√	√	√	√	√	
PEO3			√		√	√	√

2.3.2 Relationship between Graduate Profile and CPL

The Master's Program in Biology aims to produce graduates capable of developing and applying principles and concepts for the management of biological and environmental resources across various sectors, such as industry and the green economy, regional development including urban planning, sustainable agriculture, sustainable forest management, reforestation and land rehabilitation, education, and conservation. These contributions are highly impactful for society and address issues related to environmental degradation and climate change. Graduates are also equipped with the ability to solve environmental problems through interdisciplinary or multidisciplinary approaches, manage research effectively, and build sustainable collaborations with various stakeholders to enhance educational quality and competitiveness. The alignment of CPL with the graduate profile is presented in Table 2.7.

Table 2.7 Matrix of CPL Alignment with Graduate Profile

Graduate Profile	CPL-1	CPL-2	CPL-3	CPL-4	CPL-5	CPL-6	CPL-7
Academics	√	√	√	√	√	√	√
Researcher		√	√		√		
Consultant / Practitioner		√	√	√			√
Career Development		√	√	√	√		

CHAPTER 3
CURRICULUM STRUCTURE

3.1 Subject Matter and Course Mapping

3.1.1 Subject Matter

The subject matter forming the foundation of learning in the Master's Program in Biology is developed comprehensively with reference to the program's vision, mission, graduate profile, and learning outcomes. These have been agreed upon and established by the professional biology organization, KOBI (Indonesian Biology Consortium), as well as based on comparative studies with similar programs domestically and internationally, as presented in Table 3.1. The development process involved a team of lecturers from various expertise areas to ensure the relevance of the material to the established graduate profile.

Table 3.1 Subject Matter in the Master's Program in Biology

Code	Subject Matter
BK1	Personality development oriented towards RESPECT, with Scientific, Ethical, and Environmental Character
BK2	Biological Analysis Methods, Skills in Utilizing Advanced Technology
BK3	Applied Ecology and Biodiversity Conservation
BK4	Biological Studies with an Interdisciplinary Approach to the Management of Biological and Environmental Resources
BK5	Biosystematics and Biomolecular Studies
BK6	Microbiology and Biotechnology

The mapping of Subject Matter (BK) to CPL is presented in Table 3.2.

Table 3.2 Mapping of Subject Matter to Graduate Learning Outcomes (CPL)

Code	Description	CPL1 (S1 S2 KU1)	CPL2 (P1 P2 KK1 KK2)	CPL3 (P2 KU2 KK1 KK2)	CPL4 (KU2 KK1 KK2 KK3)	CPL5 (P2 KU2 KK1 KK2 KK3)	CPL6 (S1 P2 KK1 KK2 KK3)	CPL7 (S2 P1 KK2 KK3)
BK1	Personality development oriented towards RESPECT, with Scientific, Ethical, and Environmental Character	√	√		√			
BK2	Biological Analysis Methods, Skills in Utilizing Advanced Technology	√		√		√	√	

Code	Description	CPL1 (S1 S2 KU1)	CPL2 (P1 P2 KK1 KK2)	CPL3 (P2 KU2 KK1 KK2)	CPL4 (KU2 KK1 KK2 KK3)	CPL5 (P2 KU2 KK1 KK2 KK3)	CPL6 (S1 P2 KK1 KK2 KK3)	CPL7 (S2 P1 KK2 KK3)
BK3	Applied Ecology and Biodiversity Conservation		√	√		√	√	√
BK4	Biological Studies with an Interdisciplinary Approach to the Management of Biological and Environmental Resources		√	√	√	√	√	√
BK5	Biosystematics and Biomolecular Studies		√	√	√		√	√
BK6	Microbiology and Biotechnology		√	√	√	√	√	

This subject matter serves as a reference for course development. The names of courses based on the subject matter are presented in Table 3.3.

Table 3.3 Course Names for Each Subject Matter

	Study Material (Bahan Kajian)	Course Name (Nama Mata Kuliah)
BK1: Personality Development oriented towards RESPECT with Scientific Character, Ethics & Environmental Social Responsibility	Philosophy of Science	Philosophy of Science
	Research Methodology	Research Progress Seminar
	Bioethics	Research Proposal Seminar
	Research Management	Quantitative - Qualitative Biology
	Academic Ethics	Research and Dissemination
	Environmental Social Responsibility	Master's Final Examination (SAM)/Thesis
	Science Communication	Scientific Communication
BK2: Biological Analysis Methods and Advanced Technology Skills	Environmental & Biodiversity Analysis	Environmental Management Instruments
	Advanced Microscopy & Imaging	Plant Tissue Culture
	Animal Cell Culture	Animal Cell Culture
	Genomics & Bioinformatics	Bioinformatics
	Molecular Biotechnology	Molecular Biology

	Study Material (Bahan Kajian)	Course Name (Nama Mata Kuliah)
	Genetic Engineering	Genetic Engineering
BK3: Applied Ecology and Biodiversity Conservation	Priority Case Studies	Applied Ecology
		Integrative Ecology
	Ecosystem Concept & Ecosystem Services	Biodiversity, Ecosystem Services, and Climate Change
	Conservation Techniques	Conservation Biology
	Conservation Economics	Prospective Biological Resources
	Population & Community Dynamics	Management of Biological Resources and Ecosystems
	Threats to Biodiversity	Biomanagement
BK4: Interdisciplinary Biological Studies in the Management of Biological Natural Resources (BNR) and Environment	Technology & Data Science Approach, Bioinformatics & Modeling	Application of SDGs in Biological Resources
	Environmental Biotechnology:	Bioremediation
		Pollution Ecology
	Population & Ecosystem Dynamics & Interdisciplinary Case Studies	Ethnobiology and Sustainable Development
	Biological Control	Biological Control
	Microbial Ecology	Microbial Ecology
	Molecular Technology, Integrated Control	Biotechnology and Pest Control Technology Engineering
	Fundamental Concepts of Physiological Adaptation & Extreme Environments	Animal Physiological Adaptation
BK5: Biosystem and Biosystematics	Definition and Scope, Biosystem & Biosystematics, Biological vs. Phylogenetic Species Concept, Classical & Modern Approaches, Bioinformatics and Advanced Technology	Plant Embryogenesis
		Animal and Plant Biosystems
		Animal Developmental Toxicology
		Insect Ecophysiology
		Plant Environmental Physiology
		Biosystematics
		C4 Plant Biology
		Morphometrics

	Study Material (Bahan Kajian)	Course Name (Nama Mata Kuliah)
		Advanced Cell Biology
		Developmental Genetics
BK6: Microbiology and Biotechnology	Microbial Diversity, Microbial Genetics	Microbiological Agents
	Bioprospecting of Microorganisms	Bioprospecting of Microorganisms
	Microbial Genetic Engineering, Environmental Biotechnology, Agricultural Biotechnology, Analytical Techniques	Application of Microbiology and Microbial Biotechnology
	Microbial Biomass, Principles of Biomass Conversion	Mycotechnology of Biomass and Bioproducts
	Industrial Applications, Bioprocesses	Industrial and Environmental Microbiology
	Fermentation Technology	Fermentation Technology
	Microbial Physiology, Bioinformatics	Microorganism Metabolomics
	Interaction between Microorganisms and Plants	Interaction between Microorganisms and Plants

Table 3.4 Mapping of Courses to Subject Matter in the Master of Biology Program

No	Course	Credits (Theory-Practice)	Status	BK1	BK2	BK3	BK4	BK5	BK6
1	Philosophy of Science	2 (2-0)	Core	√					
2	Research Progress Seminar	3 (0-3)	Core	√					
3	Research Proposal Seminar	3 (0-3)	Core	√					
4	Scientific Communication	3 (1-2)	Core	√					
5	Quantitative-Qualitative Biology	3 (2-1)	Core	√					
6	Research Proposal Seminar	3 (0-3)	Core	√					

No	Course	Credits (Theory-Practice)	Status	BK1	BK2	BK3	BK4	BK5	BK6
7	Thesis / Research Assignment	9 (0-9)	Core	√					
8	Environmental Management Instruments	2 (1-1)	Elective		√				
9	Plant Tissue Culture	2 (2-0)	Elective		√				
10	Animal Cell Culture	2 (2-0)	Elective		√				
11	Bioinformatics	2 (2-0)	Elective		√				
12	Molecular Biology	2 (2-0)	Core		√				
13	Genetic Engineering	2 (2-0)	Elective		√				
14	Applied Ecology	3 (3-0)	Core/Elective			√			
15	Integrative Ecology	3 (2-1)	Core/Elective			√			
16	Biodiversity, Ecosystem Services, and Climate Change	3 (2-1)	Core			√			
17	Conservation Biology	3 (3-0)	Core/Elective			√			
18	Biological Resources Prospective	3 (3-0)	Core/Elective			√			
19	Management of Biological Resources and Ecosystems	2 (2-0)	Core/Elective			√			
20	Biomanagement	2 (2-0)	Elective			√			
21	SDGs Application in Biological Resources	2 (2-0)	Elective				√		
22	Biorestoration	2 (2-0)	Elective				√		
23	Ethnobiology and Sustainable Development	2 (2-0)	Elective				√		
24	Pollution Ecology	2 (2-0)	Elective				√		
25	Biological Control	2 (2-0)	Elective				√		
26	Microbial Ecology	2 (2-0)	Elective				√		
27	Biotechnology and Pest Control Engineering	2 (2-0)	Elective				√		

No	Course	Credits (Theory-Practice)	Status	BK1	BK2	BK3	BK4	BK5	BK6
28	Animal Physiological Adaptation	2 (2-0)	Elective				√		
29	Plant Embryogenesis	2 (2-0)	Elective					√	
30	Animal and Plant Biosystems	3 (3-0)	Core/Elective					√	
31	Animal Developmental Toxicology	2 (2-0)	Elective					√	
32	Insect Ecophysiology	2 (2-0)	Elective					√	
33	Plant Environmental Physiology	2 (2-0)	Elective					√	
34	Biosystematics	3 (3-0)	Core/Elective					√	
35	C4 Plant Biology	2 (2-0)	Elective					√	
36	Developmental Genetics	2 (2-0)	Core/Elective					√	
37	Microbiological Agents	2 (2-0)	Elective						√
38	Microorganism Bioprospecting	3 (2-0)	Core/Elective						√
39	Microbiology and Microbial Biotechnology Applications	3 (2-1)	Core/Elective						√
40	Microbial Biomass and Bioproducts	2 (2-0)	Elective						√
41	Industrial and Environmental Microbiology	3 (2-1)	Core/Elective						√
42	Fermentation Technology	2 (2-0)	Elective						√
43	Microbial Metabolomics	2 (2-0)	Elective						√
44	Microbe-Plant Interactions	2 (2-0)	Elective						√
45	Morphometrics	2 (2-0)	Elective					√	
46	Advanced Cell Biology	2 (2-0)	Elective					√	

3.1.2 Mapping of Courses to Graduate Learning Outcomes (LO)

Table 3.5 Matrix of the Relationship Between Courses in the Master of Biology Program and Graduate Learning Outcomes (CPL/LO) Based on Coursework

No	Course Code	Course Title	Credit (Lecture Practice)	CPL/LO 1	CPL/LO 2	CPL/LO 3	CPL/LO 4	CPL/LO 5	CPL/LO 6	CPL/LO 7
1	140320-UND202502101	Philosophy of Science	2 (2-0)	√						√
2	140320-UND202503101	Research Progress Seminar	3 (0-3)	√		√		√		
3	140320-UND202511101	Research Proposal Seminar	3 (0-3)	√		√		√		
4	140320-UND202511109	Scientific Communication	3 (1-2)	√			√			√
5	140320-UND202502102	Quantitative-Qualitative Biology	3 (2-1)		√	√		√	√	
6	140320-UND202503102	Research Progress Seminar and Dissemination	3 (0-3)	√			√	√		
7	140320-UND202504101	Thesis / Final Project	9 (0-9)	√		√	√	√		
8	140320-UND202502112	Environmental Management Instruments	2 (1-1)		√	√		√		
9	140320-UND202502127	Plant Tissue Culture	2 (2-0)		√	√		√		

No	Course Code	Course Title	Credit (Lecture Practice)	CPL/LO 1	CPL/LO 2	CPL/LO 3	CPL/LO 4	CPL/LO 5	CPL/LO 6	CPL/LO 7
10	140320-UND202502311	Animal Cell Culture	2 (2-0)		√	√				
11	140320-UND202511126	Bioinformatics	2 (2-0)		√	√	√	√		
12	140320-UND202511003	Molecular Biology	2 (2-0)		√	√		√		
13	140320-UND202502111	Genetic Engineering	2 (2-0)		√	√				
14	140320-UND202502120	Applied Ecology	3 (3-0)				√	√	√	
15	140320-UND202502201	Integrative Ecology	3 (2-1)		√		√		√	√
16	140320-UND202502108	Biodiversity, Ecosystem Services, and Climate Change	3 (2-1)		√	√			√	√
17	140320-UND202502106	Conservation Biology	3 (3-0)		√		√	√	√	
18	140320-UND202511320	Biological Resources Prospective	3 (3-0)			√		√	√	
19	140320-UND202502319	Management of Biological Resources and Ecosystems	2 (2-0)			√		√	√	√
20	140320-UND202502124	Biomanagement	2 (2-0)		√		√			√

No	Course Code	Course Title	Credit (Lecture Practice)	CPL/LO 1	CPL/LO 2	CPL/LO 3	CPL/LO 4	CPL/LO 5	CPL/LO 6	CPL/LO 7
21	140320-UND20250232305	SDGs Application in Biological Resources	2 (2-0)			√		√	√	√
22	140320-UND20250212104	Biorestoration	2 (2-0)	√	√	√			√	
23	140320-UND20253111313	Ethnobiology and Sustainable Development	2 (2-0)	√	√	√		√		
24	140320-UND20250212105	Pollution Ecology	2 (2-0)		√	√			√	
25	140320-UND20250212114	Biological Control	2 (2-0)		√	√	√			
26	140320-UND20250212128	Microbial Ecology	2 (2-0)		√	√		√		
27	140320-UND20250232311	Biotechnology and Pest Control Engineering	2 (2-0)	√	√	√			√	
28	140320-UND20250212109	Animal Physiological Adaptation	2 (2-0)		√	√				√
29	140320-UND20250310308	Plant Embryogenesis	2 (2-0)			√	√	√		
30	140320-UND20250232301	Animal and Plant Biosystems	3 (3-0)		√	√	√			
31	140320-UND20250232322	Developmental Toxicology of Animals	2 (2-0)		√	√			√	

No	Course Code	Course Title	Credit (Lecture Practice)	CPL/LO 1	CPL/LO 2	CPL/LO 3	CPL/LO 4	CPL/LO 5	CPL/LO 6	CPL/LO 7
32	140320-UND202502312	Insect Ecophysiology	2 (2-0)		√		√	√		
33	140320-UND202502302	Plant Environmental Physiology	2 (2-0)		√	√			√	
34	140320-UND202502110	Biosystematics	3 (3-0)	√	√	√	√			
35	140320-UND202502304	C4 Plant Biology	2 (2-0)		√		√		√	
36	140320-UND202502318	Developmental Genetics	2 (2-0)		√	√				
37	140320-UND202502308	Microbiological Agencies	2 (2-0)		√	√			√	
38	140320-UND202502113	Microorganism Bioprospecting	3 (2-0)	√			√	√	√	
39	140320-UND202511203	Microbiology and Microbial Biotechnology Applications	3 (2-1)		√		√	√		√
40	140320-UND202502309	Biomass and Bioproduct Microtechnology	2 (2-0)		√	√		√		
41	140320-UND202502117	Industrial and Environmental Microbiology	3 (2-1)		√		√	√		√

No	Course Code	Course Title	Credit (Lecture Practice)	CPL/LO 1	CPL/LO 2	CPL/LO 3	CPL/LO 4	CPL/LO 5	CPL/LO 6	CPL/LO 7
42	140320-UND20250210707	Fermentation Technology	2 (2-0)		√	√		√		
43	140320-UND20250230707	Microorganism Metabolomics	2 (2-0)		√	√		√		
44	140320-UND20250230606	Microbe-Plant Interactions	2 (2-0)		√	√		√		
45	140320-UND20251132222	Morphometrics	2 (2-0)		√		√	√		
46	140320-UND20250231313	Advanced Cell Biology	2 (2-0)		√	√				

3.2 2025 Curriculum for the Master of Biology Program Based on Coursework and Research for Graduates of the Master of Biology Program

The curriculum of the Master of Biology Program is systematically designed to fulfill the vision of the program, which is to provide education in the management of biological and environmental resources, as well as to contribute to and impact the sustainable management of natural resources and the environment, recognized both nationally and internationally. The Master of Biology curriculum comprises three areas of specialization: Integrated Ecology, Biosystems and Biodiversity, and Applications of Microbiology and Microbial Biotechnology. The curriculum is structured to support the program's mission, which is to produce graduates who are competent as academics, researchers, and independent, innovative, and responsible professionals/practitioners.

This graduate profile is reflected in the curriculum structure, which integrates mastery of ecological theory in an integrative manner, conservation, biodiversity, ecosystem services and climate change, biosystematics, ethnobiology and sustainable development, biomanagement, and applications of microbiology and biotechnology. Graduates are equipped

with experimental skills, an interdisciplinary approach, the ability to conduct independent research, and the capability to disseminate scientific work.

The curriculum structure adheres to the Indonesian National Qualifications Framework (KKNI) Level 8 and Ministry of Education and Culture Regulation No. 3 of 2020, and it is developed based on Graduate Learning Outcomes (CPL), encompassing the domains of attitudes, general skills, knowledge, and specific competencies.

The Master of Biology curriculum at Universitas Padjadjaran (Unpad) is designed with reference to KKNI Level 8 and aligned with industry needs, ensuring that graduates are prepared to contribute effectively to the management of biological and environmental resources. The National Higher Education Standards (SN-DIKTI) employ an Outcome-Based Education (OBE) approach. In addition to following the KKNI, the curriculum also refers to guidelines from the Indonesian Biology Consortium (KOBI) and the international accreditation agency ASIIN (The Accreditation Agency for Study Programmes in Engineering, Informatics, Natural Sciences, and Mathematics). OBE-based learning focuses on tangible outcomes in the domains of knowledge, attitudes, behaviors, and specific skills that graduates must possess. The curriculum development process in the Master of Biology Program at Unpad is carried out in accordance with SN-DIKTI standards, grounded in the Outcome-Based Education (OBE) approach and guided by KOBI.

The duration of study for students in the Master of Biology Program is four (4) semesters, with a minimum total of 54 credit hours (SKS). The program follows a combined coursework and research-based model (Master by Course & Master by Research), allowing students to develop expertise according to their specific areas of interest through three specialization groups: Integrated Ecology, Biosystems and Biodiversity, and Applications of Microbiology and Microbial Biotechnology.

3.2.1 Master's Program in Biology Based on Coursework

Distribution of Courses per Semester for the Coursework Track of the Master of Biology Program

Table 3.6 Curriculum Map for the Master of Biology Program – Coursework-Based

NO	COURSE TITLE		CATEGORY	SKS
	CODE	COURSE NAME		
	SEMESTER 1 (17-24)			
1	140320-UND202502101	Philosophy of Science	A	2
2	140320-UND202502102	Quantitative and Qualitative Biology	A	3
3	140320-UND202511109	Scientific Communication	A	3
4	140320-UND202502108	Biodiversity, Ecosystem Services, and Climate Change	A	3
5	140320-UND20251103	Molecular Biology	A	2
6	140320-UND2025xxxx	Compulsory Specialization Course1*	B	3
7	140320-UND2025xxxx	Compulsory Specialization Course2*	B	3
		Compulsory Courses		13
		Compulsory Specialization Courses		6
The number of study credits in Semester 1				**19**
	SEMESTER 2 (17-24)			
1	140320-UND2025xxxx	Compulsory Specialization Course3*	B	3
2	140320-UND2025xxxx	Compulsory Specialization Course4*	B	2
3	140320-UND2025xxxx	Elective Course 1	C	2
4	140320-UND2025xxxx	Elective Course 2	C	2
5	140320-UND2025xxxx	Elective Course 3	C	2
6	140320-UND2025xxxx	Elective Course 4	C	2
7	140320-UND2025xxxx	Elective Course 5	C	2
8	140320-UND202511101	Research Proposal Seminar	D	3
		Compulsory Specialization Courses*		6
		Elective Course**		8
Total Credits in Semester 2				**18**
Total Credits up to Semester 2				**37**
	SEMESTER 3 (6-24)			
1	140320-UND2025xxxx	Elective Course 6	C	2
2	140320-UND202503101	Research Progress Seminar	D	6
		Elective Courses		2
Total Credits in Semester				**8**
Total Credits up to Semester 3				**45**
	SEMESTER 4			
1	140320-UND202504101	Master's Final Examination (SAM)	D	9
Total Credits in Semester 4				**9**
Total Credits in Master of Biology Program				**54**

Notes:

For the Coursework Track:

- Total Required Courses: 24 SKS, comprising 13 SKS of core courses and 11 SKS of specialization core courses.
- Total Seminar/Research Core Courses: Research Proposal Seminar (SUR) 3 SKS, Research and Dissemination (SKR) 6 SKS, Master Thesis (SAM) 9 SKS; Total 18 SKS.
- Total Elective Courses Required: 12 SKS

Total Number of Courses during the Master of Biology Program: Minimum 54 SKS

Category	Description
A	Core Courses of the Study Program
B	Specialization Core Courses
C	Elective Courses
D	Seminar and Thesis Courses
*	Students must take 11 SKS of specialization elective courses
SKS	24 SKS for the Regular Program
**	Practicum: Minimum 20% of the total SKS

Thesis-Related Courses (18 SKS)

No	Code	Course Name	SKS
1	140320-UND202511101	Research Proposal Seminar	3
2	140320-UND202503101	Research Progress Seminar	6
3	140320-UND202504101	Master Thesis Defense	9
	Total		18

Core Courses of the Study Program

No	Code	Course Name	Category	SKS
1	140320-UND202502101	Philosophy of Science	A	2 (2-0)
2	140320-UND202502102	Quantitative and Qualitative Biology	A	3 (2-1)
3	140320-UND202511109	Scientific Communication	A	3 (1-2)
4	140320-UND202502108	Biodiversity, Ecosystem Services, and Climate Change	A	3 (3-0)
5	140320-UND20251103	Molecular Biology	A	2 (1-1)

Total Core Courses of the Study Program: 13 SKS

Specialization Core Courses – Integrated Ecology

No	Code	Course Name	Category	SKS
1	140320-UND202502120	Applied Ecology	B	3 (3-0)
2	140320-UND202502201	Integrative Ecology	B	3 (2-1)
3	140320-UND202502106	Conservation Biology	B	3 (3-0)
4	140320-UND202502319	Management of Biological Resources and Ecosystems	B	2 (2-0)

Total Specialization Core Courses: 11 SKS

Specialization Core Courses – Biosystems and Biosystematics

No	Code	Course Name	SKS
1	140320-UND202502110	Biosystematics	3 (2-1)
2	140320-UND202511320	Prospective Biological Resources	3 (3-0)
3	140320-UND202502301	Animal and Plant Biosystems	3 (2-1)
4	140320-UND202502318	Developmental Genetics	2 (2-0)

Total Specialization Core Courses: 11 SKS

Specialization Core Courses – Microbiology and Microbial Biotechnology Applications

No	Code	Course Name	SKS
1	140320-UND202502113	Microorganism Bioprospecting	3 (2-1)
2	140320-UND202511203	Applications of Microbiology and Microbial Biotechnology	3 (2-1)
3	140320-UND202502117	Industrial and Environmental Microbiology	3 (2-1)
4	140320-UND202511126	Bioinformatics	2 (1-1)

Total Specialization Core Courses: 11 SKS

Regulations for the Coursework-Based Master's Program:

1. Students are not required to publish scientific articles.
2. Graduates may be awarded **honors** if they have fulfilled all mandatory requirements as stipulated in the Rector's Regulation of Unpad No. 10 of 2025 and have additionally achieved at least one accepted publication in a SINTA 3-accredited national journal.

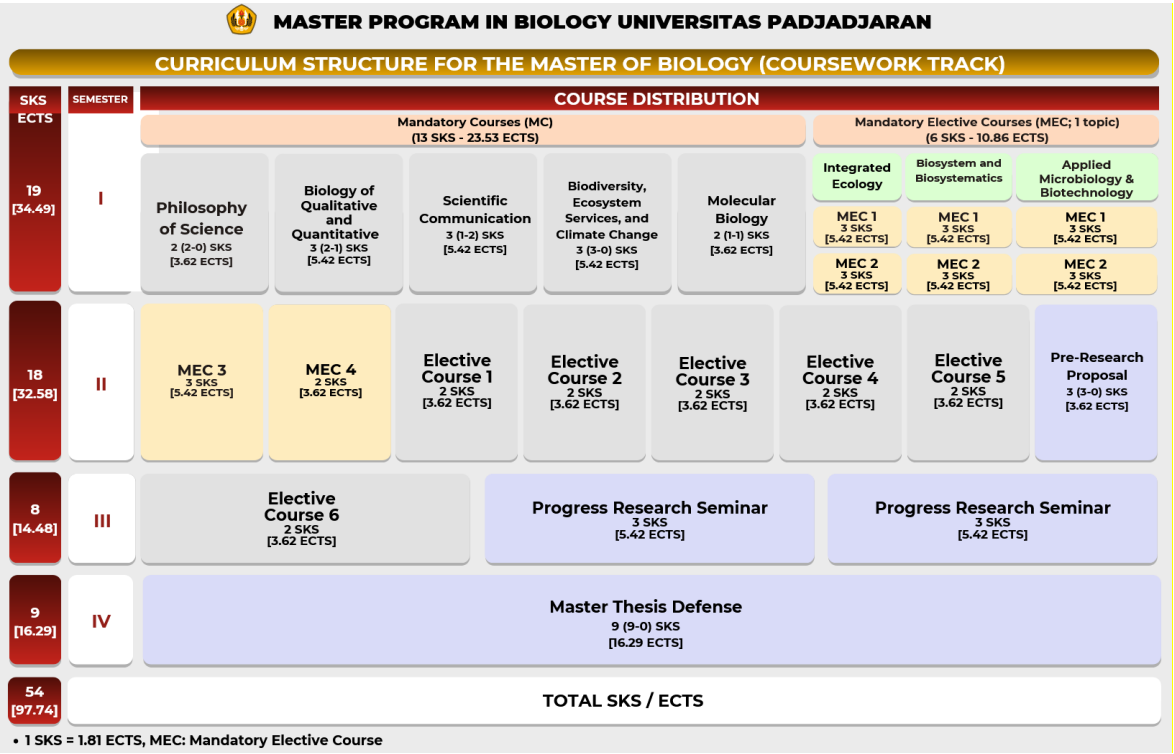

Figure 1. Curriculum of the Course-Based Master of Biology Study Program

3.2.2 Master of Biology Program – Research-Based (By Research)

Course Distribution per Semester for the Research-Based Track

Table 3.7 Curriculum Map of the Master of Biology Program – Research-Based Track

NO	COURSE TITLE		SKS (Credit)
	CODE	COURSE NAME	
SEMESTER 1			
1	140320-UND2025xxxx	Literature Review	3
2	140320-UND202511126	Research Strengthening Course (MANDATORY COURSES, MANDATORY COURSESP, ELECTIVE COURSES)	12
3	140320-UND202511126	Research Project	3
Total Credits in Semester 1 |			**18**
SEMESTER 2			
1	140320-UND2025	Research Proposal Seminar	6
2	140320-UND2025xxxx	National or International Seminar Dissemination	3
3	140320-UND2025	Self-Development Skills (Assistance/Guest Lecturer/Visiting Research)	3
Total Credits in Semester 2			**12**
SEMESTER 3			
1	140320-UND2025xxxx	Scientific Publication	9
2	140320-UND202503101	Research Progress Seminar (SKR)	6
Total Credits in Semester 3			**15**
SEMESTER 4			

1	140320-UND202504101	Master's Final Seminar (SAM)	9
Total Credits in Semester 4			**9**
Total Credits in Master of Biology Program			**54**

The Master of Biology program at FMIPA Unpad, starting from the Odd Semester of the 2025/2026 academic year, also offers a **Research-Based Master's Program (By Research)** with a total study load of 54 SKS, structured as follows:

	Course Component	**SKS**
a.	Research Strengthening Elective Courses (Program-Specific Mandatory Courses)	12
b.	Master Qualification Courses – 12 SKS, consisting of:	12
	Basic Research Skills Courses (Research Project 3 SKS and Literature Review 3 SKS)	6
	Dissemination Skills Courses for National or International Seminars	3
	Self-Development Courses (Teaching Assistance, Guest Lecture, or Visiting Research)	3
c.	Research Proposal Seminar	6
d.	Research Progress Seminar	6
e.	Scientific Publication	9
f.	Master Final Seminar	9

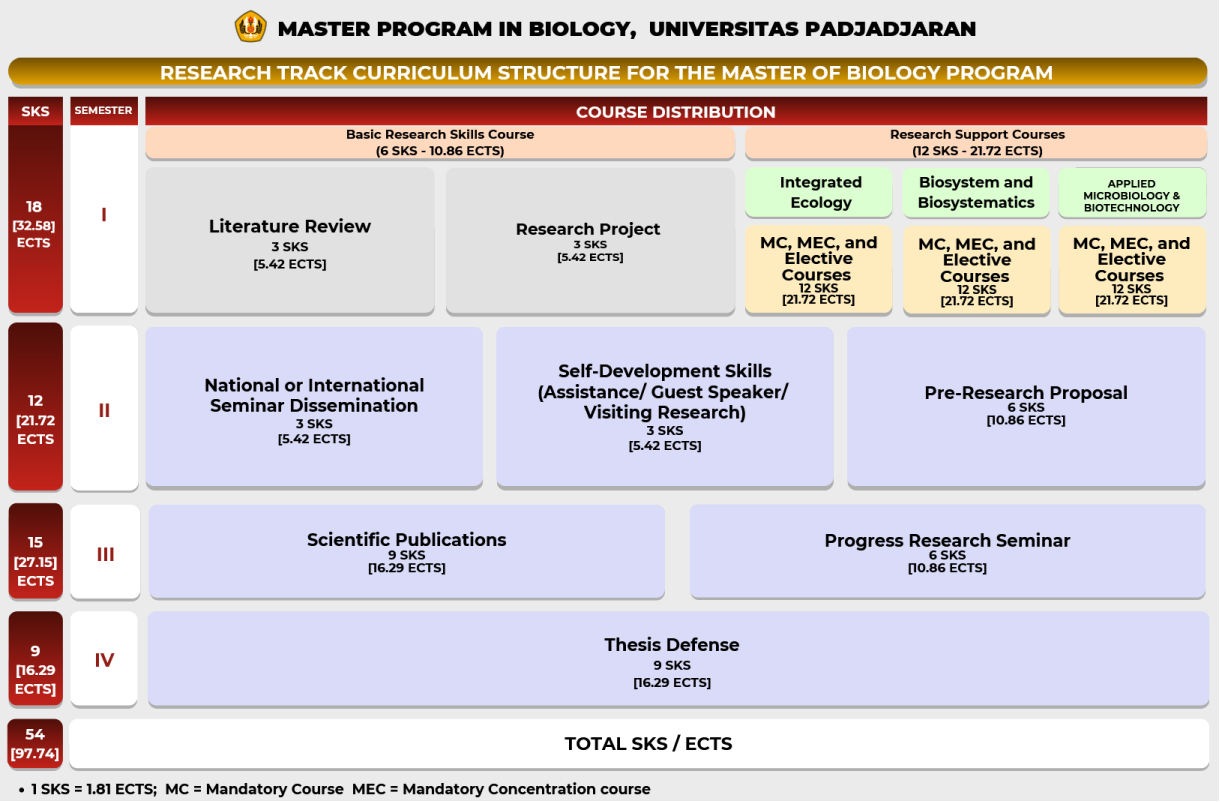

Figure 2. Curriculum of the Research-Based Master in Biology Program

Table 3.8 Core Courses, Specialization Core Courses, and Elective Courses Master of Biology Program

No	Code	Course Title	Credits (SKS)	Status	Semester			Instructor(s)
					1 (11)	1&2 (02)	2&3 (03)	
1.	140320-UND202502101	Philosophy of Science	2 (2-0)	Mandatory Courses	√			Prof. Dr. Wawan Hermawan, MS/Prof. Dr. Nia Rossiana, MS
2.	140320-UND202503101	Research Progress Seminar 1	3 (0-3)	Mandatory Courses			√	Prodi
3.	140320-UND202511101	Research Proposal Seminar	3 (0-3)	Mandatory Courses		√	√	Prodi
4.	140320-UND202511109	Scientific Communication	3 (1-2)	Mandatory Courses	√			Asri Peni Wulandari, PhD/ Dr.rer.nat Tri Dewi

No	Code	Course Title	Credits (SKS)	Status	Semester			Instructor(s)
					1 (11)	1&2 (02)	2&3 (03)	
								Kusumaningrum Pribadi
5.	140320-UND202503102	Research Progress Seminar 2	3 (0-3)	Mandatory Courses			√	Prodi
6.	140320-UND202504101	Master's Final Examination (SAM)	9 (0-9)	Mandatory Courses			√	Prodi
7.	140320-UND202502112	Environmental Management Instruments	2(1-1)	Elective Courses		√		Prof. Dr. Erri N. Megantara/Dr. Teguh Husodo
8.	140320-UND202502127	Plant Tissue Culture	2 (2-0)	Elective Courses		√		Dr Mohamad Nurzaman, M.Si. Dr. Tia Setiawati, M.Si.
9.	140320-UND202502311	Animal Cell Culture	2 (2-0)	Elective Courses		√		Dr. Yasmi Purnamasari Kuntana, S.Si., MP/Dr. Madihah, MSi /Cynthia Retna Sartika
10.	140320-UND202511126	Bioinformatics	2 (1-1)	Mandatory Courses		√		Muhammad Yusuf, M.Si., PhD/Anissa, PhD
11.	140320-UND202502311	Biotechnology and Pest Control Technology Engineering	2 (2-0)	Elective Courses		√		Prof. Dr. Wawan Hermawan, MS/Dr. Melanie, MSi
12.	140320-UND202502120	Applied Ecology	3(3-0)	Mandatory Course		√		Prof. Sunardi, PhD/Dr. Teguh Husodo
13	140320-UND202502201	Integrative Ecology	3(2-1)	Mandatory Courses		√		Prof. Dr. Erri N. Megantara/Dr. rer. nat. Tri Dewi K. Pribadi
14.	140320-UND202502108	Biodiversity, Ecosystem Services, and	3(2-1)	Mandatory Courses	√			Dr. Susanti Withaningsih/ProfDr. Budi Irawan

No	Code	Course Title	Credits (SKS)	Status	Semester			Instructor(s)
					1 (11)	1&2 (02)	2&3 (03)	
		Climate Change						
15.	140320-UND202502106	Conservation Biology	3(3-0)	Mandatory Course	√	√		Prof. Dr. Erri N. Megantara/Dr. Indri Wulandari
16.	140320-UND202531113	Ethnobiology and Sustainable Development	2 (2-0)	Elective Courses		√		Prof. Johan Iskandar, MA., PhD / Prof. Dr. Budi Irawan, S.Si, M.Si,
17.	140320-UND202502305	Application of SDGs in Biological Resources	2(2-0)	Elective Courses		√		Dr. rer. nat. Tri Dewi K. Pribadi/Prof. Dr. Suzy Anna
18.	140320-UND202502102	Quantitative - Qualitative Biology	3(2-1)	Mandatory Courses	√			Dr. Teguh Husodo / Dr. Madihah, MSi / Dr. Yasmi Purnamasari Kuntana, S.Si., MP
20.	140320-UND202502105	Pollution Ecology	2(2-0)	Elective Courses		√		Prof. Sunardi, PhD/Dr. rer. nat. Tri Dewi K. Pribadi
21.	140320-UND202502104	Bioremediation	2(2-0)	Elective Courses		√		Prof. Dr. Nia Rossiana Dr.rer.nat Tri Dewi. K Pribadi
22.	140320-UND202511320	Prospective Biological Resources	3 (3-0)	Mandatory Coursesp		√		Dr. Mohamad Nurzaman, MSi MSi/ Dr. Suryana, MP
23.	140320-UND202503108	Plant Embryogenesis	2 (2-0)	Elective Courses		√		Rusdi Hasan, M.Si., Ph.D. /Dr. Asep Zainal Mutaqin, MT
24.	140320-UND202502322	Animal Developmental Toxicology	2 (2-0)	Elective Courses		√		Dr. Desak Made Malini, M.Si / Dr. Madihah, M.Si
25.	140320-UND20251103	Molecular Biology	2 (2-0)	Mandatory Courses	√			Anissa, Ph.D / Yolani Syaputri Ph.D

No	Code	Course Title	Credits (SKS)	Status	Semester			Instructor(s)
					1 (11)	1&2 (02)	2&3 (03)	
26.	140320-UND202502111	Genetic Engineering	2 (2-0)	Elective Courses		√		Asri Peni Wulandari, PhD/Annisa, M.Si., PhD
27.	140320-UND202502110	Biosystematics	3(3-0)	Mandatory Courses		√		Prof. Dr. Budi Irawan, S.Si, M.Si, Dr. Eneng Nunuz Rohmatullayaly, M. Si.
28.	140320-UND202502301	Animal and Plant Biosystems	3(3-0)	Mandatory Courses		√		Dr. Tia Setiawati, M.Si. /Dr. Desak Made Malini, M.Si
29.	140320-UND202502302	Plant Environmental Physiology	2 (2-0)	Elective Courses		√		Dr Mohamad Nurzaman, M.Si. / Dr. Tia Setiawati, M.Si.
30.	140320-UND202502109	Animal Physiological Adaptation	2 (2-0)	Elective Courses		√		Dr. Yasmi Purnamasari Kuntana, S.Si., MP / Dr. Desak Made Malini, M.Si
31.	140320-UND202502308	Microbiological Agents	2 (2-0)	Elective Courses		√		Dr Mia Miranti Rustama, MP /Febri Doni
32.	140320-UND202511203	Application of Microbiology and Microbial Biotechnology	3(2-1)	Mandatory Coursesp	√			Prof. Dr. Ratu Safitri, MS /Febri Doni/
33.	140320-UND202502307	Microorganism Metabolomics	2 (2-0)	Elective Courses		√		Prof. Dr. Ratu Safitri, MS / Pedro Goncalves/Yolani Syaputri Ph.D
34.	140320-UND202502128	Microbial Ecology	2(2-0)	Elective Courses		√		Dr. Keukeu Kaniawati /Dr. rer. nat. Tri Dewi K. Pribadi

No	Code	Course Title	Credits (SKS)	Status	Semester			Instructor(s)
					1 (11)	1&2 (02)	2&3 (03)	
35.	140320-UND20250230606	Interaction between Microorganisms and Plants	2 (2-0)	Elective Courses		√		Prof Dr. Ratu Safitri, MS /Febri D oni/Muhamad Shakirin Mispan
36.	140320-UND20250211414	Biological Control	2 (2-0)	Elective Courses		√		Dr. Melanie, M.Si/Prof. Dr. Wawan Hermawan, MS
37.	140320-UND20250211007	Fermentation Technology	2 (2-0)	Elective Courses		√		Asri Peni Wulandari PhD / Prof. Dr. Ratu Safitri, MS
38.	140320-UND20250211313	Microorganism Bioprospecting	3 (2-0)	Mandatory Courses		√		Asri Peni Wulandari, PhD / Prof. Dr. Nia Rossiana M.S
39.	140320-UND20250230909	Mycotechnology of Biomass and Bioproducts	2 (2-0)	Elective Courses		√		Asri Peni Wulandari, PhD / Prof. Dr. Nia Rossiana M.S
40	140320-UND20250211717	Industrial and Environmental Microbiology	3(2-1)	Mandatory Courses		√		Dr Mia Miranti Rustama, MP Dr. Sri Rejeki Rahayuningsih, M.Si.
41	140320-UND20250231919	SHM and Ecosystem Management	2(2-0)	Mandatory Courses		√		Dr. Susanti Withaningsih/Dr. Keukeu Kaniawati Rosada
42	140320-UND20250230404	C4 Plant Biology		Elective Courses				Rusdi Hasan, M.Si., Ph.D. /Dr. Asep Zainal Mutaqin, MT
43	140320-UND20250231212	Insect Ecophysiology	2 (2-0)	Elective Courses		√		Dr. Melanie, MSi/Prof. Dr. Wawan Hermawan, MS
44	140320-UND20250212424	Biomanagement	2 (2-0)	Elective Courses		√		Prof. Dr. Wawan Hermawan, MS/ Dr. Teguh Husodo

No	Code	Course Title	Credits (SKS)	Status	Semester			Instructor(s)
					1 (11)	1&2 (02)	2&3 (03)	
45	140320-UND202511322	Morphometrics	2 (2-0)	Elective Courses			√	Dr. Eneng Nunuz Rohmatullayaly, M. Si.
46	140320-UND202502318	Developmental Genetics	2 (2-0)	Mandatory Courses		√		Dr. Madihah, M.Si / Anissa, PhD

Note : 1 SKS = 1.81 ECTS