



Padjajaran University
Faculty of Mathematics and Natural Sciences

ACADEMIC GUIDE
STUDY PROGRAM
MAGISTER
BIOLOGY

DEPARTEMEN
BIOLOGI

Address:

Magister Biology, Faculty of Mathematics and Natural Science
Gd. D2 Departemen Biologi FMIPA Unpad Lt. 2, Jalan Raya Bandung
Sumedang Km 21, Hegarmanah, Jatinangor, Kabupaten Sumedang, Jawa
Barat

45361 Phone/Fax: (022) 779-6412

E-mail: biologi@unpad.ac.id

FOREWORD

This 2022 Academic Guidebook for the Biology Master's Study Program, Faculty of Biology, Padjadjaran University, was published with the aim of providing academic information to students of the Class of 2022 Biology Master's Program Curriculum. This guidebook was prepared with reference to UGM Chancellor's Decree Number 38 of 2021 concerning Postgraduate Education.

With the publication of the Academic Guidebook for the Biology Master's Program, Faculty of Mathematics and Natural Science Padjadjaran University in 2022, I would like to express my thanks and appreciation to the curriculum team, study program organizers, and the team that compiled this book. I would also like to express my thanks to the heads of laboratories, department administrators, and the entire academic community of the Faculty of Mathematics and Natural Sciences, who have provided input to improve this book.

Finally, I hope that this guidebook can become an instrument that can help improve the quality of carrying out academic activities at the Master of Biology, Faculty of Mathematics and Natural Science Padjadjaran University and can be put to good use.

Sumedang, January 2022

Prof. Dr. Ratu Safitri, M.S.

TABLE OF CONTENTS

FOREWORD	ii
TABLE OF CONTENTS	iii
INTRODUCTION	1
VISION, MISSION, GOALS, OBJECTIVES AND COMPETENCE	2
A. Vision	2
B. Mission	2
C. Objective	2
D. Target	3
E. Learning Outcomes	4
F. Competence of Graduate	4
FACILITIES AND INFRASTRUCTURE	7
A. Working space for lectures	7
B. Student workspaces (lecture halls and research laboratories)	7
C. Internet Facilities	7
D. Library	7
EDUCATION ADMINISTRATION	8
A. Students Admission	8
B. Registration Terms	8
C. New Student Registration Procedure	9
D. Registration Time	10
E. Selection of Prospective Students	10
F. Student Re-registration	10
EDUCATION IMPLEMENTATION	11
A. Education System	11
B. Examination and Assessment System	12
C. Calculation of Achievement index	15
D. Student Status and Academic Leave	15
E. Extension of Study Period	16
F. Judisium	17
EDUCATION PROCESS	18
A. Academic Calendar	18
B. Guidance	18
C. Study Load	18

D.	Credit Transfer.....	19
E.	Lectures and Study Plan Cards.....	19
F.	Study Progress Card.....	20
G.	Course Repetition.....	20
H.	Comprehensive Exam.....	20
I.	Thesis.....	20
J.	Study Monitoring and Evaluation.....	24
K.	Failed Study.....	27
L.	Graduation Requirements.....	28
M.	Study Deadline.....	28
	LIST OF COURSE.....	28
1.	Matriculation Course.....	28
2.	Compulsory Courses for Study Programs.....	29
3.	Compulsory Courses for Study Interest.....	29
	SYLLABUS COURSE.....	32
	TEACHING STAFF.....	39
	ACADEMIC AND FINANCIAL STAFF.....	39

INTRODUCTION

The Biology Study Program is one of the Postgraduate study programs under the Faculty of Mathematics and Natural Sciences at Padjadjaran University. The Biology Masters Study Program was officially established with the Decree of the Minister of Education and Culture of the Republic of Indonesia No. 108/P/2014 concerning permission to organize new study programs at Padjadjaran University, Bandung. The academic activities of the Biology Masters Study Program began on the date of the issuance of the decree on March 10, 2014. Based on the National Accreditation Board for Higher Education (BAN-PT), the accreditation status of the Biology Masters Study Program is as follows:

1. Decree of the State Accreditation Agency (BAN-PT) No. 4637/SK/BAN-PT/Akred/M/XII/2017/5 December 2017, Master of Biology **Accredited B**
2. Based on LAMSAMA Decree Number 054/SK/LAMSAMA/Akred/M/XII/ December 21, 2022, Accredited **VERY GOOD**, until December 21, 2027.

VISION, MISSION, GOALS, OBJECTIVES AND COMPETENCE

A. Vision

Becoming a Master of Biology Study Program that is superior and competitive in providing education in the field of management of biological resources and the environment at the international level.

B. Mission

In general, the mission of the Biology Masters Study Program is to implement the Tri Dharma of Higher Education, which includes education, research, and community service referring to Unpad Principal Scientific Patterns.

In particular, the mission to be achieved:

1. Organizing quality, professional and ethical education in the field of Biology.
2. Developing research in the field of Biological Sciences, especially the management of biological resources and the environment.
3. Carry out quality community service and apply the concepts of Bio-management Science in supporting national development.
4. Have education management by applying credible, transparent, accountable, responsible, and fair quality assurance principles (Quality Assurance)
5. It establishes sustainable partnerships with the government, community, alums, domestic and foreign educational institutions, and relevant stakeholders based on equality and mutual trust principles.

C. Objective

The aim of education in the Biology Masters Study Program, Faculty of Mathematics and Natural Science Unpad, is the expected achievement of the Vision and Mission of the Biology Masters Study Program, as well as being part of translating the Vision and Missions of the Faculty of Mathematics and Natural Sciences and Padjadjaran University. The goal is to produce a Master of Biology who can understand and create professional graduates in managing biological resources and the environment at the national and international levels.

In detail, the educational objectives of the Biology Masters Study Program are :

1. Achieving academically competent graduates have an entrepreneurial spirit, professional, independent work ethic, discipline, character, uphold local culture, and insight into the latest

technology so that they can compete at the national and international levels.

2. Producing quality graduates in the field of science and applications in the field of biology, especially in the management of biological resources and the environment.
3. Producing a superior education system based on transparency, accountability, credibility, and responsibility.
4. Achieved an increase in the quantity and quality of research and service in the field of management of biological resources and the environment that is beneficial to society.
5. Producing excellent research that can have an impact on society.
6. Producing technology that the community can use as a community service.
7. The formation of bonds between the academic community and the community through the results of research carried out in community service programs.

D. Target

Strategic Target

1. The study program has a quality and measurable curriculum referring to the KKN and scientific associations
2. Increasing the quality of graduates who have the character of RESPECT so they have. competitiveness with other Biology Master's Degree graduates
3. Increasing the quantity and quality of research and PKM which is oriented towards downstreaming research results and products for the welfare of society.
4. Increasing the quality of academic and non-academic governance integrated with UPPS by implementing the principles of continuous quality improvement.
5. Increase collaboration with industry. National and international institutions to develop PS and the quality of graduates.

Achievement Strategy

1. Realizing accreditation standards and achievements to improve the quality of education
2. Implementation of multi-, inter- and transdisciplinary learning accompanied by strong character, leadership and entrepreneurship development.

3. Increase research collaboration with national or international institutions, as well as with industry in achieving product downstreaming
4. Develop adaptive governance that supports the achievement of national and international programs.
5. Develop joint supervision and joint research programs, increase the number of lecturers, postdocs and foreign students.

E. Learning Outcomes

The preparation of learning outcomes in the Biology Masters Program has been adapted to the Indonesian National Qualifications Framework (KKNI) level 8 (eight). The graduate profile is having scientific knowledge, analytical skills, communication skills, and skills in the field of progressive biology at the level of the cell and molecular studies, organisms, ecosystems, and the biosphere, to be able to provide innovative, responsible, and impactful solutions for society, especially related to biological resource issues and environment. Graduate competencies include academics, researchers, surveyors/ consultants/ NGOs in the management of biological and environmental resources, Entrepreneurs, and advanced studies. The Biology Masters Study Program has accommodated OBE-based curricula and RBE (Research-based Education)-based learning methods and accommodated suggestions from associations, namely KOBBI (Indonesian Biology Consortium), an organization for the development of higher education for biology study programs in Indonesia, and adopted the KKNI (Indonesian National Qualifications Framework) Level 8. In addition, learning innovations are carried out by implementing Student Center Learning (SCL) models such as Case Study (SC), Problem Base Learning (PBL), Project Base Learning, Research Base Learning (RBL), and Research-based education. Each course has a Semester Learning Plan (RPS), a guide for lecturers and students during the learning process that lasts for one semester. RPS contains learning achievement targets, study materials, learning methods, time and stages, and learning outcomes assessment. RPS is delivered at the beginning of lectures, and RPS is also given in soft files; students can access RPS on Live UNPAD.

F. Competence of Graduate

The competence of graduates of the Masters in Biology Study Program at Padjadjaran University is to become a Master of Science (MSi.) who has a personality base, mastery of knowledge and skills, as well as attitudes and behavior in work according to the level of expertise mastered, which is in

line with understanding the rules of social life. Based on the Minister of Research, Technology and Higher Education of the Republic of Indonesia No. 44 of 2015 concerning the National Higher Education Standards, it has been established that graduate competency standards are the minimum criteria regarding qualifications of abilities which include Attitudes, Knowledge, and Skills as stated in the formulation of learning outcomes. Based on these competencies, graduates of the Biology Masters Study Program at Padjadjaran University are directed to have 3 (three) competencies, namely main competencies, supporting competencies, and other competencies, which are aligned with the KKNi (Indonesian National Qualifications Framework) and KObi (Indonesian Biology Consortium). Main Competencies include aspects of Attitude, Knowledge, and Ability (Skill).

Attitude

1. Have faith in God Almighty by showing a religious, moral, and ethical attitude and upholding human values and life.
2. Internalize academic values, norms, and ethics.

Knowledge

1. Mastering biological theory, covering cell and molecular studies, organismal biology, ecology, evolution, and the biosphere.
2. Ability to analyze biological resources and environmental problems using appropriate research methods.
3. Mastering the principles and concepts of progressive technology-based measurements for analysis and synthesis of biological resources.
4. Able to understand and be involved in solving climate change problems and global warming related to biodiversity and the environment.

General Skills

1. Develop logical, critical, systematic, and creative thinking in science and technology in accordance with their areas of expertise through scientific research, and compile the results of their studies based on scientific principles, procedures, and ethics in the form of theses and publications.
2. Develop and communicate ideas, thoughts, and scientific arguments responsibly and based on academic ethics through the media to the academic community and the wider community.

3. Make decisions in the context of solving science and technology development problems based on analytical or experimental studies of information and data.
4. Documenting, storing, securing, and re-finding research data to ensure validity and avoid plagiarism.
5. Increase the capacity of independent learning.
6. Manage, develop, and maintain networks with colleagues and peers within institutions and the wider research community.
7. Identify the scientific fields that are the object of research and position them into a research map developed through an inter or multidisciplinary approach.

Special skill

1. Able to deepen or expand biology science by producing accurate, tested, and innovative multidisciplinary models/methods/theory developments as applications and solutions for managing biological resources and the environment.
2. Able to solve problems related to biological resources through deduction and induction approaches in an inter- or multidisciplinary manner.
3. Develop biological knowledge that the graduates can apply to manage biological and environmental resources and bioenergy.
4. Able to understand and be involved in solving global issues concerning the environment that are currently developing.
5. Readiness of graduates to compete at national and international levels by being involved in various scientific forums at national and international levels.

Supporting Competencies

1. Able to understand and be involved in solving global issues concerning the environment that are currently developing.
2. Readiness of graduates to compete at national and international levels by being involved in various scientific forums at national and international levels.
3. Able to manage scientific research and development, which is beneficial to society, and able to gain national and international recognition.

FACILITIES AND INFRASTRUCTURE

A. Working space for lectures

The infrastructure that exists and is owned by the Faculty of Mathematics and Natural Sciences Unpad is infrastructure that can be used by every study program in the Faculty of Mathematics and Natural Sciences Unpad including the Biology Masters Study Program at Padjadjaran University. The Secretariat of the Biology Masters Study Program is in Building D6 which is the Postgraduate building of FMIPA, while the lecturers' workspaces are in buildings D2 and D6.

B. Student workspaces (lecture halls and research laboratories)

The workplace or Student Common Room for the Biology Masters Study Program is in building D6 which is the Postgraduate building of the Faculty of Mathematics and Natural Sciences 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.

C. Internet Facilities

To support the teaching and learning process, the Biology Masters Study Program 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.

D. Library

Students of the Biology Masters Study Program 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.

EDUCATION ADMINISTRATION

A. Students Admission

Registration requirements as a student of the Biology Masters Study Program are regulated according to University regulations and can be seen here <https://smup.unpad.ac.id/magister/>. Registration to become a student follows the instructions according to the rules determined by the University. Student admissions are carried out every semester.

B. Registration Terms

The requirements for registration as a Biology Masters Study Program Student are as follows:

1. Indonesian Citizen (WNI) or Foreign Citizen (WNA).
2. Graduates of undergraduate programs accredited by BAN PT/LAM-PTKes.
3. Have an Academic Ability Test (TKA) certificate from the Padjadajaran University Psychological Innovation Center (PIP Unpad) with a minimum score of 450 which is still valid or an Academic Potential Test (TPA) from another official organizing institution recognized by UNPAD, namely PLTI Himpsi; UGM; UNAIR; UI; BAPPENAS.
4. Have a valid UNPAD English Language Test (ELT) certificate (maximum 2 years) with a minimum score of 450, or an English language proficiency test from an official organizing institution recognized by UNPAD, namely:
 - a. International TOEFL (Internet-Based Test) minimum score of 45;
 - b. Indonesian Test Service Center (PLTI) in the form of a Test of English Proficiency (TOEP) with a minimum score of 450;
 - c. British Council, IALF, and IDP form the International English Language Testing System (IELTS) Academy with a minimum score of 4.5.
 - d. Duolingo English proficiency (<https://englishtest.duolingo.com/>) with a minimum score of 80.
 - e. ITB English Language Proficiency Test (ELPT) with a minimum score of 450.
 - f. The British Institute (TBI) or English First (EF) provides a TOEFL test with a minimum score of 450.

Notes:

- a. Applicants who use an English certificate or TOEFL test outside the official institutions listed above will need a long time (> 1 month) for the verification process to the official organizing institution, so it is possible that eligible applicants will not be called for an interview according to the selection session/wave where participants register.
 - b. For applicants who are not eligible for an interview in one selection session, they will be included in the next selection session if they have corrected/completed the missing documents without having to pay a registration fee again if they are still in the same batch.
5. For participants who have scientific publications in reputable international journals (Q1) according to SJR: Scientific Journal Rankings – SCImago as first author, they are not required to have and upload TKA/TPA and TKBI scores when registering.
6. All files are attached or uploaded on the registration.unpad.ac.id page when registering.
- a. For those interested in taking part in Online TKA organized by PIP Unpad, please access <http://pip.unpad.ac.id/announcement/Tes-Kemampuan-Akademik-TKA> and for those who have registered and paid for Online TKA please pay attention to the instructions below this: Technical Implementation Instructions.
 - b. For those who are interested in taking part in TKBI Online organized by the Unpad Language Center, please access the page <https://penregistran.unpad.ac.id/> . For those who have registered and paid for TKBI Online, please pay attention to the following instructions: SMUP TKBI Online Participants Rules / Short Guide / SMUP Online TKBI Exam User Manual

C. New Student Registration Procedure

The registration process is carried out by on line. The steps taken by prospective students are as follows:

1. Create a registration account via the link <https://pendaftaran.unpad.ac.id/>
2. Obtain the registration account verification email.
3. Validate the account.
4. Log in to choose the path, the destination study program, and complete the data and upload the document.

5. Lock the registration data.
6. Pay the registration fee at the partner bank.
7. Printing proof of registration via registration account.
8. Verify documents directly on line by study program (if any).
9. Substantive test/selection by study program (if any).
10. Announcement via registration account.

D. Registration Time

The Master of Biology Study Program, Faculty of Mathematics and Natural Science, Padjadjaran University is opened every semester. Information on registration times can be found on the website <https://pendaftaran.unpad.ac.id/>

E. Selection of Prospective Students

1. Selection is carried out by a Selection Team consisting of: Deans, Vice Deans, Heads and Secretaries of Departments, Heads of Study Programs, and other lecturers representing study interests.
2. Selection criteria include:
 - a. Academic and language skills
 - b. Completeness of the specified requirements
 - c. Compatibility with educational background
 - d. Available capacity
3. The results of the selection are reported in writing by the Dean to the Rector.
4. Decisions on new student admissions are determined based on the finalization meeting of the Chancellor, Dean, and Director of Education and Teaching.
5. Acceptance and refusal to become a student is notified in writing by the Directorate of Education and Teaching Padjadjaran University in person on line.
6. Prospective new students must immediately register (registration).
7. Before filling out the study plan card (KRS), new students submit proposals for 3 (three) study interests of interest based on the order of priority. Faculties and study programs determine students' study interests.

F. Student Re-registration

Old students who will continue their studies and students who have not passed the graduation, are required to re-register (re-registration) according to the schedule. Information and re-registration procedures can

be accessed through <https://pendaftaran.unpad.ac.id/> registration is done by paying tuition fees.

EDUCATION IMPLEMENTATION

Every student who has been registered as a student in the Biology Masters Study Program, Faculty of Mathematics and Natural Science, Unpad, has the right to take part in the learning process held in the current semester. The Biology Masters Study Program organizes regular and by research, with 3 (three) study interests, namely; Integrated Ecology, Applied Microbiology, and Biosystems and Biomolecules.

A. Education System

The Biology Masters Study Program FMIPA, University of Padjadjaran (Unpad), during the founding period of the Biology Masters Study Program (2015), only carried out one (1) review in 2018 through a workshop mechanism involving the ad-hoc team and all supporting lecturers. Updating the curriculum and VMTS also refers to developments in science and technology, standardization and association directives (KOB), benchmarking reviews, users, alums, and tracer study results. Several policies have been studied, especially those that underlie the improvement of the Higher Education curriculum for national education goals, such as Law Number 12 of 2012, Presidential Regulation Number 8 of 2012 concerning the Indonesian National Qualifications Framework (KKNI), and Regulation of the Minister of Education and Culture Number 3 of 2020 concerning National Higher Education Standards that facilitate Higher Education. There is a strategic plan (renstra) and policies of the University of Padjadjaran (Unpad) and the Faculty of Mathematics and Natural Sciences (FMIPA), so through the ad-hoc team, the Master of Biology Study Program will carry out the necessary evaluations and changes. The revision of the Biology Master Study Program curriculum was carried out in 2018. The Adhoc prepared The Biology Master Study Program curriculum structure to take into account the Indonesian National Qualifications Framework (KKNI) and adapted to the needs of graduate users to produce graduates who master the field of Biology, especially management of biological resources, Strategies for achieving Program Education standards The Master of Biology study begins with the preparation of learning outcomes and the determination of the curriculum. Curriculum development Involves internal stakeholders and external stakeholders (Indonesian Biology Consortium) KOB, and graduate users) Comparative studies and

tracking studies (alums). Based on the 2015 curriculum revision meeting, three specializations were agreed upon for Biology master students, namely: (1). Applied Microbiology; (2) Integrated Ecology; and (3) Biosystems and Biomolecular.

B. Examination and Assessment System

General

1. Masters Education students can take SAM if they have met the following requirements; (1) Have passed the course set with a GPA of at least 3.00; (2) Have carried out the SUR and been declared passed; (3) The thesis manuscript has been approved by the Advisory Team; (4) Submit a certificate of proof of accepted scientific articles written while attending Masters Education courses.
2. Thesis assessment is carried out through SAM;
3. Before SAM, the Advisory Team can evaluate the material/substance of the manuscript submitted through the Research Results Seminar (SHR);
4. The SAM leader is the Head of the Masters Study Program or Head of Supervisor;
5. The SAM Discussion Team consists of 2 (two) Supervisory Team members and 3 (three) Examiner Team members;
6. Students take part in SAM at the appointed time, and the thesis manuscript must be bound in a yellow soft cover, and submitted to the SAM Leader, Advisory Team and Examining Team at least 1 (one) week before the implementation of SAM;
7. The SAM leader is not automatically a discussant, except in accordance with the student's field of knowledge being tested or as the Head of Supervisor.

Implementation of the Master's Final Examination (SAM)

1. SAM is carried out as a panel and attended by at least 3 (three) discussants, consisting of 1 (one) or 2 (two) members of the Advisory Team and 1 (one) or 2 (two) members of the Examiner Team plus 1 (one) SAM leadership;
2. The Testing Team at the specified SAM time must be the same as the Testing Team at the SUR time;
3. In SAM, the discussant evaluates the contents of the thesis manuscript with the following assessment weights:
 - a. Significance of Research Background and/or Research Focus, and Problem Formulation, weight 10% (Ten Percent);

- b. Relevance and up-to-dateness of the Literature Review, weight 20% (Twenty Percent);
- c. Accuracy of the formulation of the Rationale Framework and Research Proposition/Hypothesis, weight 10% (Ten Percent);
- d. Suitability of Research Methods, weight 10% (Ten Percent);
- e. Sharpness of analysis and integrity of thought, weighting 20% (Twenty Percent);
- f. The stability and quality of the conclusions, as well as the suggestions submitted, weight 10% (Ten Percent);
- g. Scientific writing ability, weight 10% (Ten Percent);
- h. Communication skills in the oral exam, weighting 10% (Ten Percent).

The assessment weight of 100% (one hundred percent) above can be added to the assessment weight of 10% (ten percent) below, if the student can demonstrate a contribution to the development of science, technology and development;

- 4. The final score on the SAM is given in the form of a raw score with a range of 0-100;
- 5. At the end of the SAM, the discussant provided the following assessment;
 - a. students are declared to have passed if they get an average score ≥ 68 ; 2) students are declared not to have passed if they get an average score < 68 .
 - b. The scores of the discussants are added together with the percentage of the Advisory Team 60% (sixty percent) and the Examining Team 40% (forty percent) as NA, without first being converted into HM;
- 6. Convert NA into HM and AM using the following guidelines:

Final Score	Quality Letters	Quality Score	Category
$80 \leq NA \leq 100$	A	4	Very Good
$68 \leq NA < 80$	B	3	Good
$56 \leq NA < 68$	C	2	Enough
$45 \leq NA < 56$	D	1	Less
$NA < 45$	E	0	Very Less

- 7. Students who are declared not to have passed the SAM are given the opportunity to take the SAM test 1 (one) time within the agreed time period, taking into account the study time limit.

In conditions of a public health emergency, holding the Final scientific work session in the Master's Program can be carried out using electronic media/teleconference while still referring to the Quality Standards for Organizing the Final Scientific Work Session.

1. The implementation of trial exams in the Master's Program study program as mentioned in numbers 1, 2 and 3 can be carried out via electronic media/teleconference.
2. Trial exams in the Unpad environment continue to follow educational guidelines for various levels and disciplines and in case of emergency conditions in the community, adjustments are made via electronic media/teleconference.
3. Implementation of Thesis Examinations or other Final Examinations for Masters Program Students:
 - a. The session is officially opened by the Head of the Study Program in accordance with applicable regulations;
 - b. Before the trial is held, the Head of the Study Program checks the presence of students participating in the trial, supervisors, discussants/examiners either physically at the place/venue or present remotely/virtually;
 - c. The trial is officially opened after meeting a quorum in accordance with applicable regulations, and the trial is held as a panel attended physically at the venue/venue or present remotely/virtually;
 - d. The main screen is the screen used to display presentations from students participating in the trial which can also be viewed by the supervisor, discussant/examiner remotely/virtually via the electronic media they use.
 - e. Parties who are physically present at the hearing location/venue are only possible if the number is small and must pay attention to physical distancing and health protocols determined by the government.
 - f. The hearing follows the applicable provisions after meeting a quorum led by the Head of the Study Program for Students of Undergraduate and Applied Undergraduate Programs and Thesis Examinations or for Students of Masters, Professional and Specialist Programs;
 - g. The final score on the trial exam in number 6) above is given in the form of a raw score with a range of 0-100, which is then sent via electronic media, such as email or other electronic

media that has been determined by the Head of the Study Program, in in order to determine graduation/judicial status in accordance with the standard rules for determining graduation/judicial status at that level of education by the Head of the Study Program.

C. Calculation of Achievement index

The final score is given in the form of a quality letter based on a raw score using a range between 0-100, with the following guidelines:

$NA \geq 80$	Grade A	Quality 4
$68 \leq NA < 80$	Grade B	Quality 3
$56 \leq NA < 68$	Grade C	Quality 2
$45 \leq NA < 56$	Grade D	Quality 1
$NA < 45$	Grade E	Quality 0

Calculation of the grade point average (GPA) and the cumulative grade point average (GPA), the quality letter (HM) is converted into a quality score (AM) by taking into account the guidelines above, namely:

A	=	4, 00
B	=	3, 00
C	=	2, 00
D	=	1, 00

D. Student Status and Academic Leave

1. New students are required to register (registration) and re-register (herregistration) every semester.
2. At the beginning of each semester, students are required to fill out the KRS which is approved by the Guardian Lecturer.
3. Students will not receive academic services as long as they do not register/register and do not fill out the KRS in the current semester.
4. Temporary cessation of studies (academic leave) with the permission of the Unpad Chancellor based on the recommendation of the Faculty Dean. Academic leave is only permitted for 1 (one) semester.
5. Scholarship recipients are not permitted to take academic leave, except for the reason of suffering from a serious illness as proven by a certificate from an expert doctor.
6. In conditions during a public health emergency, the following provisions apply:

- a. The student's study limit ends in the current semester, the student's study limit can be extended by 1 (one) semester
- b. Students as referred to in point a. that is; (1). Students who have taken a contract for a thesis course or other form of final assignment and whose research proposal has received approval from the Supervisor; (2). Students who experience obstacles in working on and completing their thesis or other forms of final assignments as a result of activities due to the Pandemic.

E. Extension of Study Period

1. The study period and load for implementing the Master's Education Program is a maximum of 4 (four) years or 8 (eight) semesters.
2. The cumulative study load for Masters Education is at least 36 (thirty-six) credits and a maximum of 50 (fifty) credits, and the maximum study per semester is 24 (twenty-four) credits.
3. In conditions during a public health emergency, the following provisions apply:
 - a. The student's study limit ends in the current semester, the student's study limit can be extended by 1 (one) semester
 - b. The students referred to in number 1) are:
 - Students who have taken a contract for a Thesis Assignment course or other form of final assignment and whose research proposal has received approval from their supervisor
 - Students who experience obstacles in working on and completing their Thesis or other forms of Final Projects as a result of activity restrictions due to the Public Health Emergency period
 - Students who have been scheduled to take the Thesis Examination or other Final Examination for Masters Students.
4. To obtain an extension of the study limit as referred to in letters c numbers 1) and 2), students must submit a letter requesting an extension of the study limit to the Dean.
5. The Dean has the right to propose the names of students who receive an extension of their study limits on the basis of a public health emergency to the Vice Chancellor for Academic and Student Affairs who has received a recommendation from the supervisor and head of the study program.

6. For the conditions in number 2 letters a, b, c and d, students are exempt from the obligation to pay Single Tuition Fees (UKT) or Educational Implementation Fees (BPP).
7. If when the extension of the study deadline ends, it turns out that the student is unable to complete his studies, he will be considered to have withdrawn.

F. Judisium

1. Graduation judiciary is based on the final GPA, namely the average combined Quality Score (AM) of course equipment with AM SAM, as follows:

Quality Score	Judisium
3,00 – 3,50	Satisfying
3,51 – 3,75	Very Satisfying
3,76 – 4,00	Cumlaude (with additional conditions)

2. The graduation predicate "Praise", has other additional requirements, namely:
 - a. Time for Masters Education graduation (SAM date) takes into account the scheduled study period plus 1 (one) semester (0.5 years) or a maximum of 5 (five) semesters;
 - b. Has at least 1 (one) scientific article with accepted status in an accredited national journal of at least SINTA 2 (Two) or a reputable international journal;
 - c. There are no courses with a C grade;
 - d. Do not repeat studies in the same study program at Unpad.
3. Students who fulfill the "Praise" Yudisium based on GPA, but do not meet the additional requirements in accordance with point 2, then the graduation Yudisium is only designated "Very Satisfactory".

EDUCATION PROCESS

A. Academic Calendar

1. Academic activities for odd semesters start from mid-August to mid-February.
2. Academic activities for even semesters start from mid-February to mid-August.

B. Guidance

1. The Head of the Biology Study Program of the Master's Program will determine the Academic Supervisor in the first semester.
2. Lecturer Advisor Academic on duty to do academic guidance to students to make plans in the learning process and encourage students to graduate in accordance with the program and competencies that have been set
3. Thesis supervisor is determined at the end of the first semester through a meeting of the Faculty Leaders, Head of Study Programs and lecturer representatives from each interest. The Main Thesis Supervisor can appoint a Companion Supervisor with a field of science that supports the thesis theme. Advisors are teaching staff in the Biology Master Study Program or Study Program and other agencies with the permission/approval of the Dean on the consideration of the Head of the Study Program.

C. Study Load

1. The cumulative study load for the Biology Masters Program, Faculty of Mathematics and Natural Sciences, Padjadjaran University is 39 credits distributed over 4 (four) semesters, with proportions.
 - Lectures : 32 credit hours
 - Research proposal seminar : 1 credit hours
 - Thesis : 6 credit hours
2. Study time for the Biology Masters Program is scheduled for 4 (four) semesters, but can be completed in less than 4 semesters and a maximum of 8 semesters (4 years) including the preparation of a thesis.

The structure of the 2018 Curriculum is as follows:

Credit	Semester	Distribution of Courses				
15	1	Biological philosophy and ethics (3)	Quantitative and qualitative Biology (3)	Scientific Communication (3)	Biodiversity, ecosystem services and climate change (3)	Compulsory Courses / Specialization (3) : (1) Integrated Ecology, (2) Applied Microbiology; (3) Biosystems and Biomolecular
12	2	Elective courses (10)				Research proposals and seminars (2)
6	3	Research and dissemination (5)				Research progress report (1)
6	4	Examination of theses and publications				
Total Credits 39						

D. Credit Transfer

Student can take courses at other University (Institute) Postgraduate Programs based on the MoU, agreement on equality of learning substances, and assessment standards with the Faculty of Mathematics and Natural Sciences Padjadjaran University.

E. Lectures and Study Plan Cards

The research field of biology department lecturers according to the study material are as follows:

Integrated Ecology Expertise Group

Prof. Dr. Erri Noviar Megantara; Prof. Johan Iskandar, M.Sc., Ph.D; Parikesit, M.Sc., Ph.D; Dr. M.Si; Dr. Teguh Husodo, M.Si; Sunardi, M.Si., Ph.D; Dr.rer.nat. Tri Dewi K. Pribadi, M.Si; Dr. Keukeu Kaniawati Rosada, M.Si; Dr. Susanti Withaningsih, M.I.L, Dr. Suryana, S.Si., M.Si

Biosystems and Biomolecular Expertise Group

Prof. Dr. Wawan Hermawan, MS; Dr. Mohamad Nurzaman, M.Si; Dr. Tia Setiawati, M.Si; Dr. Desak Made Malini, M.Si; Dr. Kartiawati

Alipin, MS; Dr. Budi Irawan*, S.Si., M.Si; 1.Dr. Eneng Nunuz Rohmatullayaly, Dr. Madihah, Annisa, M.Si., Ph.D, Dr. Sri Rejeki Rahayuningsih, M.Si; Annisa, M.Si., Ph.D, Dr. Yasmi P. Kuntana, MS.

Applied Microbiology Expertise Group

Prof. Dr. Nia Rosiana, M.S; Dr. Mia Miranti, MP; Asri Peni Wulandari, M.Sc., Ph.D; Febri Doni M.Sc., Ph.D; Yolani Syaputri M.Sc., Ph.D;

The procedure for filling out the Study Plan Card (*Kartu Rencana Studi; KRS*) is as follows:

- a. Filling in the KRS is carried out one week before academic activities start each semester according to the calendar schedule academic.
- b. Students fill in the KRS automatically online via PAUS to obtain approval from the Academic Supervisor.
- c. The Academic Supervisor gives KRS approval directly through PAUS.

F. Study Progress Card

1. Study Progress Card is a list of course grades that have been taken by students in the current semester
2. *Kartu Kemajuan Studi* (KKS) is a material for making transcripts of student grades

G. Course Repetition

Course repetition is allowed once. Maximum retest score B.

H. Comprehensive Exam

The Comprehensive Examination is held to assess a students comprehensive understanding of all courses taken during the course of the year study period and student readiness in carrying out thesis research.

I. Thesis

1. Final Year Project: Thesis

1. Thesis is a student's final scientific work, made based on research results using applicable scientific methods and principles.
2. The thesis must have value for the development of science, both theory and application.

3. The thesis is the student's original scientific work as indicated by a stamped statement regarding its authenticity.
4. Writing a thesis follows the applicable thesis writing guidelines.

2. Thesis Evaluations

1. The thesis assessment is carried out through the Thesis Examination (TE).
2. Prior to TE, the Advisory Team and Discussion Team evaluate the material/substance of the manuscript submitted through the thesis text.
3. Thesis examiners (UT) consist of a supervisor team, 3 (three) discussants, and are led by 1 (one) TE chairman.
4. The thesis examination can be carried out if attended by at least 3 (three) examiners (represented advisory and discussing teams) and added by 1 (one) TE chairman.
5. TE is led by the Head/Secretary of the Masters Program or the Head of the Advisory Team.
6. The TE leadership does not automatically act as a discussant, unless it is in accordance with the field of study of the student being tested, or as the Head of the Advisory Team.

3. Thesis Exam Requirements

1. Master program students can take UT if they meet the following requirements:
 - (a) Have passed the set of courses with a GPA of at least 3.00
 - (b) Has carried out a research proposal seminar and was declared passed
 - (c) The thesis manuscript has been approved by the Advisory Team
 - (d) Submit proof of published writing (which was written while attending the master program lectures), which can be in the form of:
 - Scientific article in the form of writing that is relevant to the field of science being studied or is part of a thesis, as the main author, at least in a journal that has an ISSN and can be accessed online; or
 - Scientific articles in seminar proceedings that have been published nationally; or

- Uploaded scientific articles in Unpad e-journals or Unpad Scientific Libraries, which have been approved by the supervisor team and the Postgraduate Program; or
 - Textbooks or textbooks, which are relevant to the scientific field and have an ISBN.
2. The thesis manuscript must be in black hard cover.
 3. TE can be implemented if attended by at least three examiners representing the Advisory Team and Discussion Team, plus one TE chairman.
 4. In this UT the Examination Team evaluates the contents of the thesis manuscript with the following weights:
 - a) Significance of Research Background, 10 percent weight.
 - b) Relevance and Sophistication of Literature Review/ Literature Review/ Literature Review, weight 10 percent.
 - c) The accuracy of the Formulation of the Thinking Framework, Premises/Propositions and Hypotheses/Research Focus/Statement of the problem, weight 5 percent.
 - d) Appropriateness of Research Methods, 10 percent weight.
 - e) Level of originality of research, weight 15 percent.
 - f) Sharpness of analysis and wholeness of thought, weight 15 percent.
 - g) Contribution to the development of science, technology and development, 10 percent weight.
 - h) Stability and quality of conclusions, as well as suggestions submitted, weight 5 percent.
 - i) Scientific writing ability, weight 10 percent.
 - j) Communication skills in the oral exam, weight 10 percent.
 5. The value of UT is given in the form of a score with a range of 0-100. Students are declared to have passed UT if they get at least a score of 68.
 6. The score from the testing team is added up with the percentage of the supervisor team 60% and the review team 40%, without first converting it into a quality letter.
 7. TE results can be:
 - a) Pass without improvement and be able to take the Thesis Examination in no later than two weeks after the TE implementation;

- b) Pass with minor improvements and be able to take the Thesis Exam at the earliest one month after the TE implementation;
 - c) Pass with major improvement and be able to take the Thesis Examination no later than three months after the TE implementation;
 - d) Did not pass and must correct and repeat the UT at the earliest six months later. If the TE test results are still declared not passed, the person concerned is declared not passed (dropped out) in the Padjadjaran University master's program.
8. TE repairs must obtain written approval from the Advisory Team as evidenced by the signature of the Advisory Team member on the approval sheet.
 9. The numerical value obtained is then converted into a quality score as shown in the Value Conversion Table in the Appendix..
 10. Thesis exams (UT) and college exams are converted into quality letters (HM) with the following guidelines:

$NA \geq 80$	Grade A	Quality 4
$68 \leq NA < 80$	Grade B	Quality 3
$56 \leq NA < 68$	Grade C	Quality 2
$45 \leq NA < 56$	Grade D	Quality 1
$NA < 45$	Grade E	Quality 0

11. Graduate graduation is based on the final GPA, which is the average combined quality score (AM) of the course set with the thesis quality score (AM)

2,75 – 3,40	Satisfying
3,41 – 3,70	Very Satisfying
3,71 – 4,00	Cumlaude

12. Predicate of Graduation with Honors, has other additional requirements, namely: the time of graduation of the master program (date of thesis examination) taking into account the scheduled study period plus 0.5 years (maximum time of graduation in semester V).
13. After the thesis examination is declared passed, there is no further revision of the thesis manuscript.

J. Study Monitoring and Evaluation

Lecture

Academic achievement is expressed in the form of GI (Gratitude Index) and GPA (Grade Point Average). GI and GPA calculations are carried out at the end of each semester.

Course Assessment

- a. The Final Score (NA) at the end of each course is a combination of Quizzes, Assignments, Mid Semester Examinations (UTS), Final Semester Examinations (UAS), and all assignments given during the semester, each with its own weight.
- b. The final score is given in the form of a quality letter based on a raw score using a range between 0-100, with the following guidelines:

$NA \geq 80$	Grade A	Quality 4
$68 \leq NA < 80$	Grade B	Quality 3
$56 \leq NA < 68$	Grade C	Quality 2
$45 \leq NA < 56$	Grade D	Quality 1
$NA < 45$	Grade E	Quality 0

- c. Calculation of the grade point average (GPA) and the cumulative grade point average (GPA), the quality letter (HM) is converted into a quality score (AM) by taking into account the guidelines above, namely:

A	=	4, 00
B	=	3, 00
C	=	2, 00
D	=	1, 00

- d. Obtaining a grade below C in semester I, semester II, and/or semester III will result in students being subject to sanctions for termination of study.

Research Proposal Seminar (SUR)

- a. Research Proposal Seminar (SUR) is a student work plan in the context of preparing a thesis, in other words SUR is a thesis framework which after being filled in with tested empirical data becomes a thesis.
- b. SUR is conducted no later than the end of semester V.

- c. RPS is carried out once; if it does not pass repeated at most once. The repetition time limit is a maximum of three months from the first SUR.
- d. SUR examiners consist of 2 (two) supervisors, 3 (three) discussants, and are led by 1 (one) RPS leader.
- e. SUR can be carried out if at least 3 (three) examiners (1 supervisor and 2 discussants) are present and 1 (one) RPS chairman is added.
- f. The SUR chairman is the Coordinator of the Masters Study Program or the Leader of the Advisory Team, which is determined based on the Dean's Decree
- g. The SUR leader is not automatically a discussant, unless appointed because it is in accordance with the field of study of the student being tested or as the Head of the Advisory Team.
- h. SUR is conducted openly and can be attended by students and lecturers..
- i. If a student's SUR is declared not to have passed, the student concerned is given the opportunity to repeat the SUR once which is carried out no later than three months after the first SUR. Sanctions for termination of study will be given, if the second SUR is declared not passed.
- j. The SUR leader does not automatically act as a discussant, unless it is in accordance with the field of study of the student being tested, or as the Head of the Advisory Team.

Assessment of Research Proposal Seminar

The score at the Research Proposal Seminar (SUR) is given in the form of a raw score with a range of 0-100

NA ≥ 80	Grade A	Quality 4
68 ≤ NA < 80	Grade B	Quality 3
56 ≤ NA < 68	Grade C	Quality 2
45 ≤ NA < 56	Grade D	Quality 1
NA < 45	Grade E	Quality 0

1. The Examiner Team evaluates the material/substance of the research proposal submitted by students. This means that before SUR is carried out, each member of the examiner already has an assessment that the research proposal text is appropriate/not feasible as the forerunner of master-level scientific work and its readiness to be implemented in the field

- is evident.
2. In this SUR the Examination Team evaluates student accountability for questions that are critical or seeking clarification of the material/substance of the research proposal with an assessment weight:
 - a. Significance of Research Background, 15 percent weight.
 - b. Relevance and Currentness of Literature Review/Review Libraries, weight 15 percent.
 - c. Accuracy of Formulation of Thinking Framework, Premises/ Propositions and Hypotheses/ Research Focus/ Problem Statement, weight 15 percent.
 - d. Appropriateness of Research Methods, 10 percent weight.
 - e. The level of originality of the research weight is 15 percent. Contribution to the development of science, technology and development, weighting 10 percent.
 - f. Scientific writing ability, 10 percent weight.
 - g. Communication skills in the oral exam, weight 10 percent.
 3. At the end of the SUR the Examiner Team gives the following assessment:
 - a. students are declared to have passed if they get an average score of ≥ 68 .
 - b. students are declared disqualified if students get an average score of < 68 .
 4. The average SUR value is converted into a quality letter (HM) using the applicable guidelines; If it is stated that they have not passed the SUR, students are required to repeat their research proposal. The opportunity to repeat SUR is only given once (no later than 3 months after the first SUR); if up to two times the SUR is declared not passed, then the student is subject to the sanction of termination of study.

Research

1. Research is carried out after students graduate from SUR and improvements have been made which are approved by the Supervisors and can be accounted for as a research proposal for the Thesis.
2. Advisors, if necessary, can supervise the research location to see the validity of the research conducted by the student concerned.

K. Failed Study

Academic Alert

Written academic warnings and general study termination sanctions are regulated as follows:

1. An academic warning is given to:
 - a. students who at the end of semester I or II obtain a GPA below 2.75;
 - b. students who at the end of semester IV have not conducted a Research Proposal Seminar;
 - c. students who at the end of semester VII have not taken the thesis examination;
 - d. Not registering/re-registration (registration) for one semester.

Termination of Study

Termination of study is imposed on students who:

1. At the end of semester III obtain a GPA below 2.75.
2. At the end of semester I, II and III, obtain a quality letter below C.
3. At the end of semester V, they have not conducted the Research Proposal Seminar or have failed to pass the Research Proposal Seminar for the second time.
4. Unable to complete studies at the end of semester VIII.
5. Two semesters in a row (or not consecutively) do not register, do not participate in teaching and learning activities, do not complete KRS, or withdraw from teaching and learning activities.
6. Death.
7. Doing things that defame the alma mater (Padjadjaran University) or violate scientific ethics (for example committing plagiarism).

Academic Sanctions

1. Academic sanctions are imposed on students who commit acts that are not commendable in the teaching and learning process, both academic and non-academic, or violate the law (for example committing a crime) or commit an immoral act.
2. Types of academic sanctions for certain cases are determined (based on applicable laws and regulations) by an Advisory Council consisting of the Chancellor, Deputy Chancellor for Learning and Student Affairs, Director of the Postgraduate

Program and Assistant Director of the Postgraduate Program. If necessary, you can invite the Dean and/or Deputy Dean for Learning and Student Affairs of the relevant Faculties, Head of the Advisory Team, Head of Study Program/S2. The results of the Advisory Council's decision can then be forwarded through a decision by the Chancellor of Padjadjaran University. Implementation of the Advisory Council Session under the coordination of the Postgraduate Program.

L. Graduation Requirements

1. To obtain a diploma and attend graduation, master program students who are declared to have passed, must immediately submit a thesis book that has been corrected and signed by the Advisory Team, as well as yellow hard cover, and other things that have been stipulated.
2. For master program students who have been declared passed, but still have not submitted their thesis books within three months of being declared passed, the graduation concerned will be cancelled.
3. Graduates can attend graduation if they have fulfilled the obligations as stated in number one.
4. Graduates of the Masters Program are given the right to use the Masters academic title in the Program in accordance with the Program taken, namely: M.Sc

M. Study Deadline

Study time for the Biology Masters Program is scheduled for 4 (four) semesters, but can be completed in less than 4 semesters and a maximum of 8 semesters (4 years) including the preparation of a thesis.

LIST OF COURSE

1. Matriculation Course

Courses in the Biology Masters Program at Padjadjaran University are distributed in the form of 28 credits of compulsory courses that must be taken in the first 2 (two) semesters, and 4 (four) credits of elective courses allocated in the second semester. There are 9 (nine) elective courses available so far. Special Topic courses are intended as a means of accelerating research proposals.

2. Compulsory Courses for Study Programs

Compulsory subjects are Philosophy and Bioethics, Quantitative and Qualitative Biology, Molecular Biology, Bio-Management, Scientific Writing Techniques, Conservation Biology, Genetic Engineering, Applied Microbiology, Environmental Physiology, Biodiversity, Ecosystem Services and Climate Change, Biorestitution, Topics Special, Research Proposal, and Thesis..

3. Compulsory Courses for Study Interest

- Based on the 2015 curriculum revision meeting, three specializations were agreed upon for Biology master students, namely: (1). Applied Microbiology; (2) Integrated Ecology; and (3) Biosystems and Biomolecular.
- Elective courses are Pollution Ecology, Microorganism Bioprospect, Microorganism Physiology, Microorganism Interaction with Plants, Environmental Stress with Embryogenesis, Invitro Culture Technology REEPS (Rare Endangerous Endemic Protected Species), Biosystematics, Biological Control, Environmental Management Instruments and Micro Industry and Environment

The distribution of courses in each semester in the Biology Masters Study Program is as follows:

A. Semester I (15 credit hours)

No.	Code	Courses	credit hours
1.	D20D1101	Philosophy and Bioethics	3
2.	D20D1102	Biology of Quantitative and Qualitative	3
3.	D20D2103	Biodiversity, Ecosystem Services, and Climate Change	3
4.	D20D1105	Scientific Writing Techniques	3
5.	D20D21xx	Compulsory Courses / Specialization	3
		Total credit hours	15

B. Semester II (12 credit hours)

No.	Code	Courses	Credit hours
1.	D20D21xx	Elective courses	2
2.	D20D21xx	Elective courses	2

3.	D20D21xx	Elective courses	2
4.	D20D21xx	Elective courses	2
5.	D20D21xx	Elective courses	2
6.	D20D21xx	Research proposals and seminar (2)	2
		Total credit hours	12

C. Semester III (6 Credit hours)

No.	Code	Courses	Credit hours
1.	D20D3101	Research progress report (1)	1
2		Research and dissemination (5)	5
		Total Credit hours	6

D. Semester IV (6 Credit hours)

No	Code	Courses	Credit hours
1.	D20D4101	Examination of theses and publications	6
		Jumlah SKS	6

E. Elective courses

No	Code	Elective course	Credit hours
1.	D20D2105	Pollution Ecology	2
2	D20D2106	Microorganism Bioprospect	2
3	D20D2107	Fermentation Technology	2
4	D20D1208	Environmental Stress with Embryogenesis	2
5	D20D2109	REEPS InVitro Culture Technology (<i>Rare Endangerous Endemic Protected Species</i>)	2
6	D20D2110	Biosystematics	2
7	D20D2111	Biological Control	2
8	D20D2112	Environmental Management Instruments	2

9	D20D2113	Ethnobiology and Sustainable Development	2
10	D20D2114	Microbial Ecology	2
11	D20D1104	Bio-Management	3
12	D20D1106	Conservation of Biology	2
13	D20D1107	Microbiology of Industry and Environment	2
14	D20D2101	Genetic Engineering	2
15	D20D2102	Environmental Physiology	2
16	D20D2104	Biorestation	2
17	D20D1103	Molecular Biology	2

F. Special Topic

No	Kode	Mata Kuliah Topik Khusus	SKS
1.	D20D2114	Aquatic Ecology Research Review	3
2	D20D2115	Nano Biological Control Technology	3
3	D20D2116	Ethnozology	3
4	D20D2117	Mammal Ecology	3
5	D20D2118	Biodiversity Management Planning	3
6	D20D2119	Aquatic ethno-ecology	3
7	D20D2120	Biological Resources Prospective	3
8	D20D2121	Landscape Ecology	3
9	D20D2122	Carbon sink	3
10	D20D2123	Ethno-Lichenology	3
11	D20D2124	Biology of Interaction between Microorganisms and Plants	3
12	D20D2125	Microorganism Isolation and identification Technique	3
13	D20D2126	Bio-informatics	3
14	D20D2127	Plant Tissue Culture	3

SYLLABUS COURSE

1	D20D1101	Philosophy and Bioethics	2-0
<p>Philosophy and Bioethics course is a compulsory course in the master's degree program that studies the sources of knowledge and ways to acquire knowledge (epistemology); studying the theory of the nature of knowledge and the nature of value (ontology); and for knowledge (axiology); scientific method; culture social learning; protection of culture social; ethical issues in research; the principles of intellectual property rights (IPR).</p>			
2	D20D1102	Biology of Quantitative and Qualitative	2-0
<p>In the old paradigm, the study of biodiversity and conservation is a monodisciplinary domain of biology. However, in its development in studying various aspects of biodiversity and conservation in integrative biology, it is not enough to study biology only, considering that the study of biodiversity and conservation is very closely related to various socio-economic and cultural aspects. public. Therefore, for the study of biodiversity and conservation, it is necessary to understand quantitative and qualitative methods, studies that integrate biological and socio-economic aspects as well as community culture. This course discusses quantitative and qualitative biological methods that integrate social aspects into the aspects of biodiversity and conservation.</p>			
3	D20D1103	Molecular Biology	2-0
<p>This course will study the molecular basis of heredity, the central dogmas of molecular biology, DNA replication, and repair, the relationship between genes and proteins, differences in transcription and translation in prokaryotes and eukaryotes, gene expression and molecular biology application technology in various fields related to biology.</p>			
4	D20D1104	Bio-Management	2-0
<p>This course is studying environmental management in development with all its aspects based on basic science and ecological principles in agriculture, industry, transmigration, pollution, and other environmental problems. Development ecology, sustainable development, environmental carrying capacity, population pressure, environmental management in resettlement, industry, agriculture, and transport</p>			

5	D20D1105	Scientific Writing Techniques	2-0
<p>Scientific Article Writing course is a course that provides knowledge and skills to students to be able to publish the results of their research in accredited national and international journals.</p>			

6	D20D1106	Conservation of Biology	2-0
<p>This course covers the boundaries and principles of conservation in the field of biology which is an interdisciplinary approach, which among others relates to ecology, economics, sociology, public policy, and ethics. Next, the discussion will focus on an overview of basic definitions and concepts regarding species, populations, ecosystems, and biodiversity, then continue with more complex topics such as mass extinction, ecosystem degradation, over-exploitation, and the relationship between species extinction and human activities. This course also covers the principles of preventing species extinction, maintaining genetic variation, and how to protect and restore ecosystems.</p>			

7	D20D1107	Microbiology of Industry and Environment	2-0
<p>This course studies about understanding, exploration, and commercial application of microorganisms that play a role in the food, non-food, health, and environmental industries. The microbiology industry includes the use of microorganisms in producing a product such as enzymes, food and beverages, food additives, fuels (biofuels), and drugs (pharmaceuticals). The microbiological environment includes the utilization results of the microbiology industry for the application of technology carried out on waste management and pollution control.</p>			

8	D20D1201	Genetic Engineering	2-0
<p>This course explains recombinant DNA technology including gene cloning, primers, and primary design; Enzymes involved in the cloning process, Determination of cloning vectors and expression vectors of DNA transformation, Selection and detection of DNA, DNA sequencing and data interpretation & Bioinformatics; and Applications in cloning technology including gene manipulation in prokaryotes, construction of gene libraries, isolation of genes and promoters, as well as gene expression in enzyme production; The application of this engineering is then given cases that have been applied to animals and plants, as well as the development of insights about the GMO case and the need for bioethical studies on genetically engineered products.</p>			

9	D20D1202	Environmental Physiology	2-0
<p>This course studies the concept of the interaction of plants and animals with their environment, focusing on extreme environmental changes so that these changes are a form of stress for plants and animals that will affect them physiologically. Material related to environmental physiology in plants will be studied regarding the response and physiological adaptation of plants to various environmental stresses which include water/drought deficit environments and waterlogging; salinity stress; temperature and humidity, soil pH, heavy metals, and mineral deficiencies. This course also includes a discussion of the symptoms of plants experiencing stress, the characteristics of physiological and morphological adaptations as well as regulatory mechanisms/signaling pathways. While material for the interaction between animals and the environment will study the mechanism of how animals (especially vertebrates) can adapt, and tolerance in extreme environments both physiologically and behaviorally so that they can survive and reproduce in their habitat.</p>			

10	D20D1203	Biodiversity, Ecosystem Services, and Climate Change	2-0
<p>This course discusses about relationship between biodiversity, ecosystem services, and climate change. The subject matter also includes various problems and the conservation of biodiversity. This lecture discusses several theories, concepts, and hypotheses regarding the relationship of biodiversity with ecosystem processes, structures, and functions. Biodiversity as foundation in the provision of various categories of ecosystem services. relationship between biodiversity and land cover and land use, as well as biodiversity valuation and its problems. Another topic of discussion is the relationship between the condition of biodiversity, ecosystem services, climate change, and human well-being. This lecture also discusses empirical facts about the relationship between biodiversity, ecosystem services, and climate change; biodiversity conservation in order to maintain ecosystem services; threats and opportunities from climate change in the utilization of biodiversity and its ecosystem services. This lecture also discussed global and national agreements and action plans related to biodiversities such as the Convention on Biological Diversity, Ramsar, Cartagena Protocol, and IBSAP.</p>			

11	D20D1204	Biorestation	2-0
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Discusses the principles of ecosystem restoration utilizing organisms or the application of biological systems in improving the quality of the environment that has been damaged by human activities or by natural causes such as contamination of water bodies, groundwater and soil by hazardous and toxic wastes. It also discusses the techniques applied in bioremediation and efforts to improve ecosystem quality through environmental biotechnology which covers processes and applications for protection and restoration in improving environmental quality, sustainable remediation, long term remediation, clean production, zero waste, waste to product, paradigm 5 R waste treatment; Polluted river case studies, post-mining land case studies, post-fire case studies.

12	D20D1205	Special Topic	2-0
<p>Special topics are supporting and supporting courses for core courses chosen by students in accordance with the field of research interest in their final project. Special topic courses can be implemented at the study program level and/or across study programs and tertiary institutions through a transfer credit mechanism (courses).</p> <p>Lectures: Master in Biology Programme</p>			

13	D20D2101	Research Proposal Seminar	2-0
<p>Prior to conducting a research proposal seminar, you are required to attend at least five times a research proposal seminar in a relevant field of science. The oral presentation of the thesis research proposal is carried out in front of the assessment team consisting of the Advisory Committee and designated reviewers.</p> <p>Lectures: Master in Biology Programme</p>			

14	D20D2201	Thesis	2-0
<p>Papers which are the result of their own research which must be accounted for verbally in the final examination session after being unanimously approved by the supervising committee. The paper will be assessed by an assessment team consisting of a commission of advisors and assigned reviewers.</p> <p>Lectures:</p>			

Master in Biology Programme

15	D20D2105	Pollution Ecology	2-0
<p>The Pollution Ecology course is a course that reviews scientifically the interaction of pollutants with their ecosystems, starting from the sources of pollutants with their characteristics and travel, their transportation and transformation in ecosystems which are influenced by physical-chemical conditions, and their impact on ecosystem structure and function.</p>			

16	D20D2106	Microorganism Bioprospect	2-0
<p>This course studies: Scope and history of bioprospection; definition of bioprospection and biopiration, examples of microorganism bioprospection, potency of microorganism bioprospection that can be patented; world and national conventions on biodiversity and ecological bioprospection and microorganism biodiversity; road map for microorganism bioprospection, activities and strategies for bioprospecting with biotechnology: processes of isolation, screening, and optimization of cultivation and production tests, potential products resulting from bioprospecting of microorganisms in biopreneurship.</p>			

17	D20D2107	Fermentation Technology	2-0
<p>Explains the principles of Fermentation, as well as the factors that influence it which includes limits, fermented products, Components of the fermentation process, Industrial Microorganisms, Kinetics of Microorganism Growth, Isolation, Preservation and Improvement of Important Microorganisms for Industry, Media, Development of Inoculums for Industrial Fermentation, Fermenter Design , Instrumentation and control, Areas and Agitation, Recovery and Purification of fermented products, Treatment of effluents, Economical calculations.</p>			

18	D20D2108	Environmental Stress with Embryogenesis	2-0
<p>This course discusses the interaction of animal and plant embryogenesis in the environment. For animals, starting from the stages of embryogenesis (cleavage, blastulation, gastrulation, and neurulation), organogenesis, mechanisms of normal development and factors that affect malformations due to a stressed environment such as agents. infection, physical agents, chemical agents, hormones. For Plants, the concept of embryogenesis includes sprogenesis and gametogenesis</p>			

(Androceum and Gynoecium) and the pattern of development of the polyembryonic embryo sac normally.

19	D20D2109	REEPS InVitro Culture Technology (Rare Endangerous Endemic Protected Species)	2-0
<p>In this course students are given an understanding of the concepts and principles of in vitro culture techniques in both animals and plants. In vitro plant culture, the concept and its application were studied as an alternative method that can be utilized in plant propagation efforts, especially those with REEPs status. Students are introduced to various kinds of cultures that can be used according to the characteristics of the plants and the purpose of the culture, the stages of in vitro plant propagation which include the selection of plants as explant material, sterilization of the explants to the culture stage, namely acclimatization, various basic mediums and growth regulators and their physiological functions . Besides that, students are given an understanding of the application of in vitro culture in relation to plant genetic manipulation. In animal cell in vitro culture material, a method is studied to reproduce tissue/cells derived from the original animal tissue after first experiencing separation (disaggregation) mechanically, or chemically (enzymatically) in vitro (in a glass tube).</p>			

20	D20D2110	Biosystematics	2-0
<p>The Biosystematics course discusses the concept of biosystematic relations and people's taxonomy, in the context of the wealth of flora and fauna and ecosystems as a basis for making predictions and conservation strategies in an effort to support the use and management of biological resources in a sustainable/environmental perspective. In this context, taxonomic information data sources (morphological and anatomical information, embryological and developmental information, palynological information, breeding system information, chemical information, chromosomal and molecular information) are examined; Phylogenetic and Evolution; The concept of Types and the hierarchy under types; Case study, Taxonomic study (Revised, numerical taxonomy) in groups of lower plants, higher plants, invertebrates and vertebrates.</p>			

21	D20D2111	Biological Control	2-0
<p>This course studies the understanding, exploration, and application of insect pest population control concepts in natural or artificial</p>			

environments, biologically. Control of insect pest populations with biological materials includes the use of biopesticidal plants (produce chemical compounds that are toxic, antifeedant, repellent), the use of microbial agents derived from fungi, bacteria and viruses and natural enemies ('natural enemies'). also studied the 'mode of action' of each biological substance against target insects. Also learned how to isolate and produce these biological compounds as well as microbial agents and maintenance of these natural enemies in a simple way as part of the development of a biomanagement strategy.

22	D20D2112	Environmental Management Instruments	2-0
<p>The material presented includes important instruments used in managing the environment. The first time, students will be given a thorough understanding of the nature of the natural interrelationships between the components of the living environment, namely between the biotic and abiotic environment, and the physical environment and the social environment; then an understanding of the negative impacts caused by development activities. To support sustainable development, an instrument is needed that can evaluate development plans and activities, these instruments include the Environmental Impact Analysis (AMDAL) and Strategic Environmental Assessment (KLS), both of which have a spectrum from the policy level to development implementation. In addition, an Environmental Management System (EMS) such as ISO 14000, clean production and environmental valuation will also be introduced.</p>			

23	D20D2113	Ethnobiology and Sustainable Development	2-0
<p>The material presented includes human relations in the utilization of plants, animals, microbes in managing the environment, which is passed down from generation to generation. This course reviews a lot about the role of humans in environmental management which has been and is still being applied in today's life. This course also reviews the relationship between local wisdom and the rapid developments in the global era, especially in sustainable development.</p>			

24	D20D2114	Microbial Ecology	2-0
<p>Microbial Ecology lectures discuss the interactions between microorganisms (e.g. bacteria, microfungi, plankton) and the environment</p>			

and how complex microbial communities become part of the function and stability in natural and artificial ecosystems. This exploration and application of microbial ecology can provide insight as well as stimulate students to find forms of microbial communities that can be applied for environmental protection and public health along with the restoration of degraded natural resources.

TEACHING STAFF

Integrated Ecology Expertise Group

Prof. Dr. Erri Noviar Megantara; Prof. Johan Iskandar, M.Sc., Ph.D; Parikesit, M.Sc., Ph.D; Dr. M.Si; Dr. Teguh Husodo, M.Si; Sunardi, M.Si., Ph.D; Dr.rer.nat. Tri Dewi K. Pribadi, M.Si; Dr. Keukeu Kaniawati Rosada, M.Si; Dr. Susanti Withaningsih, M.I.L, Dr. Suryana, S.Si., M.Si

Biosystems and Biomolecular Expertise Group

Prof. Dr. Wawan Hermawan, MS; Dr. Mohamad Nurzaman, M.Si; Dr. Tia Setiawati, M.Si; Dr. Desak Made Malini, M.Si; Dr. Kartiawati Alipin, MS; Dr. Budi Irawan*, S.Si., M.Si; 1.Dr. Eneng Nunuz Rohmatullayaly, Dr. Madihah, Annisa, M.Si., Ph.D, Dr. Sri Rejeki Rahayuningsih, M.Si; Annisa, M.Si., Ph.D, Dr. Yasmi P. Kuntana, MS.

Applied Microbiology Expertise Group

Prof. Dr. Nia Rosiana, M.S; Dr. Mia Miranti, MP; Asri Peni Wulandari, M.Sc., Ph.D; Febri Doni M.Sc., Ph.D; Yolani Syaputri M.Sc., Ph.D;

ACADEMIC AND FINANCIAL STAFF

Agus Tarma