COURSE PORTFOLIO
Master Degree of Biology Education

Molecular Biology and Technology
Academic Year – 2020/2021

Program Learning Outcame

PLO1	Have integrity and professional ethics, self-development, and make innovations to improve the quality of education and community lifelong learning..
PLO2	Able to apply analytical, critical thinking skills, and innovative in the field of biology education.
PLO3	Able to work together in multicultural groups and collaborate with various parties/stakeholders in solving a problem in the field of education.
PLO4	able to analyse the basic philosophy and theory in the study of biology and biology learning
PLO5	Able to design and manage classical, laboratory, natural and digital/virtual-based biology learning in education units.
PLO6	Able to design and publish a research through various approaches/methods to solve problems in the field of biology education (PLO6).
PLO7	Able to manage and develop digital technology-based biology learning tools according to the characteristics of students.
PLO8	Able to design and conduct evaluations and assessments of learning in educational units.
PLO9	Able to improve mastery of biological material in the fields of plant and animal structure, environment, bio-conservation, biomolecular, and biotechnology.
PLO10	Able to analyse and synthesize problem solutions in biology learning through interdisciplinary, transdisciplinary and multidisciplinary approaches

Course Outcome (CO):

CO 1.	Students are able to explain the scope and development of molecular genetics
CO 2.	Students are able to explain the structure of genetic material
CO 3.	Students are able to detail the processes of DNA replication and protein synthesis
CO 4.	Students are able to differentiate the regulatory processes of gene expression in prokaryotes and eukaryotes
CO 5.	Students are able to explain the types, compounds that cause and the impact of DNA mutations
CO 6.	Students are able to explain the history and scope of biotechnology
CO 7.	Students are able to explain the principles and stages of Recombinant DNA technology
CO 8.	Students are able to explain molecular analysis techniques: extraction, amplification and detection of DNA
CO 9.	Students are able to explain the applications of biotechnology in various fields and are able to carry out biotechnology experiments
CO 10.	Students are able to explain bioethics and the impact of biotechnology products on the environment

Lecturers :

1. Dr. Tri Handayani K., M.Si
2. Dr. Rini P., M.Biomedik

Mapping Course Learning Outcome (CO) and Program Learning Outcome (PLO)

Program Learning Outcome / Course Outcome	Have integrity and professional ethics, self-development, and make innovations to improve the quality of education and community lifelong learning (PLO1).	Able to apply analytical, critical, innovative, and abstraction thinking skills in the field of biology education (PLO2).	Able to improve mastery of biological material in the fields of plant and animal structure, environment, bio-conservation, biomolecular, and biotechnology (PLO9).	Able to analyze and synthesize problem solutions in biology learning through interdisciplinary, transdisciplinary and multidisciplinary approaches (PLO10)
CO 1. Students are able to explain the scope and development of molecular genetics	● (Assignment, Midterm Exam)			
CO 2. Students are able to explain the structure of genetic material;	● (Assignment, Midterm Exam)			
CO 3. Students are able to detail the processes of DNA replication and protein synthesis	● (Assignment)			
CO 4. Students are able to differentiate the regulatory processes of gene expression in prokaryotes and eukaryotes	● (Assignment, Final Exam)			
CO 5. Students are able to explain the history and scope of biotechnology		● (Midterm Exam)		
CO 6. Ability to compile a scientific paper on ecological,				● (Project)

environmental, bio-conservation issues;				
CO 7. Students are able to explain molecular analysis techniques: extraction, amplification and detection of DNA		● (Final Exam)		
10 8. Students are able to explain molecular analysis techniques: extraction, amplification and detection of DNA				● (Project)
CO 9. Students are able to explain the applications of biotechnology in various fields and are able to carry out biotechnology experiments.				● (Project)
CO 10. Students are able to explain bioethics and the impact of biotechnology products on the environment			● (Assignment)	

Forms of Assessment

Group/Individuals Assignment = 20%
Midterm examination = 30%
Final examination = 30%
Research project = 20%
Total = 100%

	PLO 3 Critical Thinking	PLO 5 Problem Solving	PLO 7 Decision Making	PLO 8 Decision Making
Group/Individuals Assignment	50%	50%	0%	0%
Midterm examination	60%	40%	0%	0%
Final examination	60%	40%	0%	0%
Research project	0%	0%	50%	50%

Outcomes Assessment

No	Nama	Assignment			Midterm Exam	Final Exam	Project	Grade	
		Assignment 1	Assignment 2	Average					
1	A	85	82	83,5	**60**	**82**	**84**	76,10	B+
2	B	85	85	85	**78**	**87**	**84**	83,30	A-
3	C	90	90	90	**88**	**90**	**87**	88,80	A
4	D	90	82	86	**83**	**84**	**83**	83,90	A-
5	E	88	84	86	**90**	**86**	**85**	87,00	A
6	F	90	85	87,5	**90**	**87**	**85**	87,60	A
7	G	90	84	87	**75**	**85**	**88**	83,00	A-
8	H	85	84	84,5	**78**	**86**	**86**	83,30	A-
9	I	90	84	87	**75**	**87**	**83**	82,60	A-
10	J	85	86	85,5	**90**	**84**	**85**	86,30	A
11	K	85	82	83,5	**70**	**82**	**88**	79,90	B+

Calculation of Weight per PLO

Form of Assessment	Weight	Weight per PLO				Total	Total Weight			
		PLO 2	PLO 3	PLO 9	PLO 10		PLO 2	PLO 3	PLO 9	PLO 10
Group/Individuals Assignment	0,20	0,50	0,50	0,00	0,00	1,00	0,10	0,10	0,00	0,00
Midterm examination	0,30	0,60	0,40	0,00	0,00	1,00	0,18	0,12	0,00	0,00
Final examination	0,30	0,60	0,40	0,00	0,00	1,00	0,18	0,12	0,00	0,00
Research project	0,20	0,00	0,00	0,50	0,50	1,00	0,00	0,00	0,10	0,10
Total	1,00	1,70	1,30	0,50	0,50	1,00	0,46	0,34	0,10	0,10

Example of PLO Calculation

No	Nama	Assignment			Midterm Exam	Final Exam	Project	Grade	
		Assignment 1	Assignment 2	Average					
1	A	85	82	83,5	**60**	**82**	**84**	76,10	B+

PLO Assessment Rubric

PLO	Performance Criteria	Excellent (E)	Good (G)	Satisfy (S)	Fail (F)
2	Analyze fundamental concepts, such as structure of genetic material, the processes of DNA replication and protein synthesis.	Students are ability to correlate fundamental concepts, such as structure of genetic material, the processes of DNA replication and protein synthesis. **with a score of at least 80.**	Students are ability to correlate fundamental concepts, such as structure of genetic material, the processes of DNA replication and protein synthesis.; **with a score of at least 70 and less than 80.**	Students are ability to correlate fundamental concepts, such as structure of genetic material, the processes of DNA replication and protein synthesis. **with a score of at least 60 and less than 70.**	Students are ability to correlate fundamental concepts, such as structure of genetic material, the processes of DNA replication and protein synthesis. **with a score of less than 60.**
3	Students are able to analyse and differentiate the regulatory processes of gene expression in prokaryotes and eukaryotes problem and issues	Students are analyse and differentiate the regulatory processes of gene expression in prokaryotes and eukaryotes problem and issues **with a score of at least 80.**	Students are analyse and differentiate the regulatory processes of gene expression in prokaryotes and eukaryotes problem and issues with a score of at least 70 and less than 80.	Students are analyse and differentiate the regulatory processes of gene expression in prokaryotes and eukaryotes problem and issues with a score of at least 60 and less than 70.	Students are analyse and differentiate the regulatory processes of gene expression in prokaryotes and eukaryotes problem and issues with a score of less than 60.
9	Ability to design and analyse methods the types, compounds that cause and the impact of DNA mutations, molecular analysis techniques: extraction, amplification and detection of DNA.	Students are able to analyse methods the types, compounds that cause and the impact of DNA mutations, molecular analysis techniques: extraction, amplification and detection of DNA. with a score of at least 80.	Students are able to analyse methods the types, compounds that cause and the impact of DNA mutations, molecular analysis techniques: extraction, amplification and detection of DNA. with a score of at least 70 and less than 80.	Students are able to analyse methods the types, compounds that cause and the impact of DNA mutations, molecular analysis techniques: extraction, amplification and detection of DNA. with a score of at least 60 and less than 70.	Students are able to analyse methods the types, compounds that cause and the impact of DNA mutations, molecular analysis techniques: extraction, amplification and detection of DNA. with a score of less than 60.

10	Ability to analyse the applications of biotechnology in various fields and are able to carry out biotechnology experiments, bioethics and the impact of biotechnology products on the environment	Students are able to analyse the applications of biotechnology in various fields and are able to carry out biotechnology experiments, bioethics and the impact of biotechnology products on the environment with a score of at least 80.	Students are able to analyse the applications of biotechnology in various fields and are able to carry out biotechnology experiments, bioethics and the impact of biotechnology products on the environment with a score of at least 70 and less than 80.	Students are able to analyse the applications of biotechnology in various fields and are able to carry out biotechnology experiments, bioethics and the impact of biotechnology products on the environment with a score of at least 60 and less than 70.	Students are able to analyse the applications of biotechnology in various fields and are able to carry out biotechnology experiments, bioethics and the impact of biotechnology products on the environment with a score of less than 60.

Example of PLO Predicates for Each Student

NAMA	PLO 2	PLO 3	PLO 9	PLO 10
A	73,72	74,68	84,00	84,00
	Good	Good	Excellent	Excellent

PLO Predicates for All Students

No	Nama	Assignment			Midterm Exam	Final Exam	Project	Grade	
		Assignment 1	Assignment 2	Mean					
1	A	85	82	83,5	**60**	**82**	**84**	76,10	B+
2	B	85	85	85	**78**	**87**	**84**	83,30	A-
3	C	90	90	90	**88**	**90**	**87**	88,80	A
4	D	90	82	86	**83**	**84**	**83**	83,90	A-

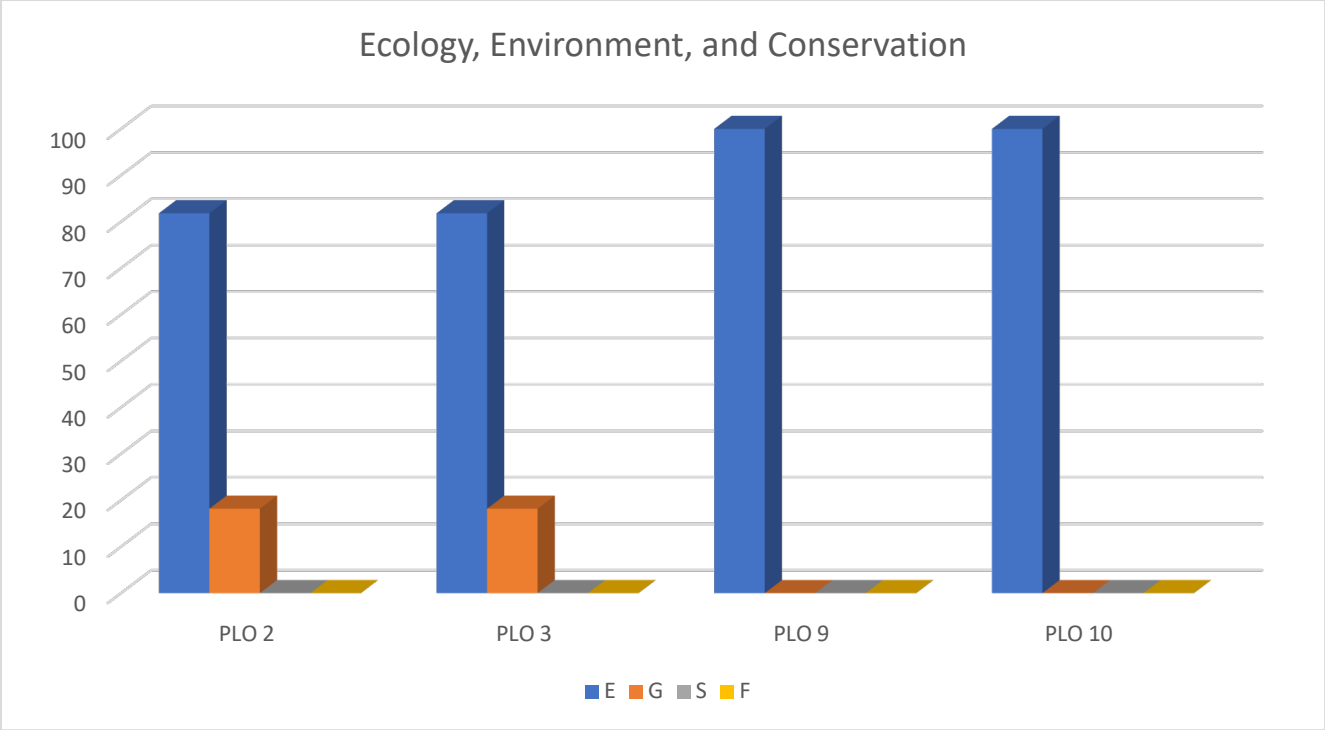
5	E	88	84	86	**90**	**86**	**85**	87,00	A
6	F	90	85	87,5	**90**	**87**	**85**	87,60	A
7	G	90	84	87	**75**	**85**	**88**	83,00	A-
8	H	85	84	84,5	**78**	**86**	**86**	83,30	A-
9	I	90	84	87	**75**	**87**	**83**	82,60	A-
10	J	85	86	85,5	**90**	**84**	**85**	86,30	A
11	K	85	82	83,5	**70**	**82**	**88**	79,90	B+

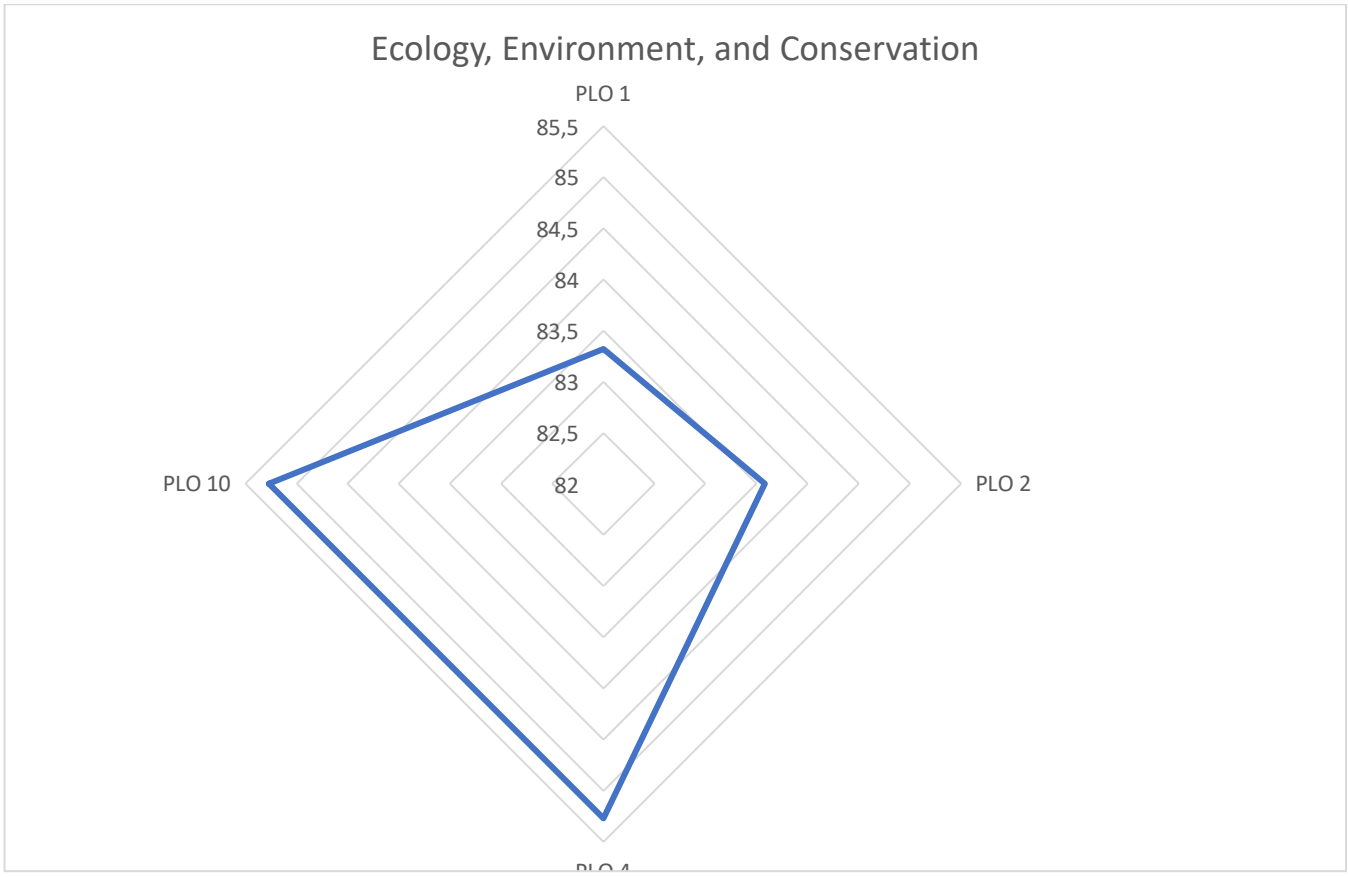
NAMA	PLO 2	PLO 3	PLO 9	PLO 10
A	73,72	74,68	84,00	84,00
B	83,04	83,24	84,00	84,00
C	89,22	89,29	87,00	87,00
D	84,04	84,24	83,00	83,00
E	87,57	87,41	85,00	85,00
F	88,28	88,21	85,00	85,00
G	81,52	82,06	88,00	88,00
H	82,54	82,74	86,00	86,00
I	82,30	82,76	83,00	83,00
J	86,67	86,56	85,00	85,00
K	77,63	78,21	88,00	88,00

Distribution of PLO Achievements

GRADE	PLO 2	PLO 3	PLO 9	PLO 10
E	82%	82%	100%	100%
G	18%	18%	0%	0%
S	0%	0%	0%	0%
F	0%	0%	0%	0%

Achievement Percentage of PLO


Ecology, Environment, and Conservation
100
90
80
70
60
50
40
30
20
10
0
PLO 2
PLO 3
PLO 9
PLO 10
E G S F


Ecology, Environment, and Conservation
PLO 1
85,5
85
84,5
84
83,5
83
82,5
82
PLO 2
PLO 10