EXPECTED LEARNING OUTCOMES (ELO)

BIOLOGY STUDY PROGRAM

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EXPECTED LEARNING OUTCOMES

BSP is established to satisfy the need of state and society in providing human resources who understand basic concepts of Biology to solve people's problems such as availability of food and energy, health and environmental issues caused by human activity. Therefore, based on the need, BSP arranges Expected Learning Outcome (ELO) for graduates. The ELO of BSP graduates are developed based on the result of tracer studies, which is carried on every four years regularly involving stakeholders, graduates, lecturers and students. Moreover, the ELO also formulated based on bench-marked to world-leading Biology department from both national and International universities (Appendix 1.6 UB Academic Handbook). The Expected Learning Outcomes (ELO) established by BSP has become the competencies for student undergraduate achievements at the end of their study. The ELO is described and published to the public and academicians throughout the world through the website, brochures, academic handbook and continuously socialized within BSP staff and academicians.

The philosophy of BSP education is to produce graduates who have possession on an essential skill of modern biology, understand conservation concept and life skill, so they are regarded as Plus Biology Graduates. The BSP is leading the institution in developing modern biology concepts especially on molecular biology and nano-biology to conserve biodiversity, which was cited by national and international scientists. Hence, the BSP has become a reference by other biology department and attracted industries to establish cooperation with BSP. The excellency of BSP is very suitable to use as a medium to achieve the ELO.

Modern biology concepts focus on principles and topics of Contemporary Biology that contribute to solving complex human problems. Thus, by having comprehensive understanding, students can have skills in problem-solving related to Biology in today and future. Graduates are expected to be driving the force in social change for a better life because the biology relates to almost all life aspects such as green technology, human culture and environment problems. The competencies / ELO has been reflected in the alumnus profiles..

BSP implemented ELO that has been approved in 2010 (Table 2.1.1). Therefore, the ELO was revised to fulfil KKNI (Indonesian National Qualifications Framework) in 2014. Thereafter BSP is implementing the new ELO in 2014 (Table 2.1.2). BSP implemented several teaching-learning approaches and monitoring strategy to achieve the ELO (Table 2.1.3). The ELOs are defined as four aspects that are knowledge literacy, job skill (ability to work), attitude, personal value, and managerial ability.

Knowledge literacy. Understanding on the principles of biology; biological resources; environmental conservation; application of biological concept to explore and utilize biological resources; biotechnology; standard methods for analysis and synthesis of biological phenomenon ranging from general to a particular field; being able to operate biological software and necessary instruments. **Work Skill (ability to work)**. The graduates being able to provide the alternative solutions for solving the problem of science and technology, especially management and uses of natural resources in a narrow scope through application of biological science and entrepreneur practice. Therefore, it can be used to take appropriate decision for the community, state and private institutions. **Attitude and Personal Value**. The formation of young scientist character who has bio-entrepreneurship spirit, good attitude, high performance, and passion for success. **Managerial Ability**. The graduates being able to make right decisions based on the data and information in solving human problems that aware to biodiversity conservation and being able to provide guidance in a team or community in carrying out the work responsibly to achieve sustainable organizational goals.

The four aspects were further elaborated at every level of education as arranged in the curriculum structure (Table 2.1.2). The Knowledge Literacy aspect is step by step achieved from the first semester, which is divided into four main competencies of graduate.

There are (1) Biological science and success life skill; (2) Structure, function, and organization of life; (3) Coordination of life, regulation of growth and development and its analysis, and also; (4) Bio-scientific research and writing. The two supporting/additional competencies of the Knowledge Literacy are a good understanding in management related to research field & development, and in market analysis for the entrepreneurship initiation. ELO is evaluated every four years through curriculum arrangement. The result of evaluation and tracer study, teaching-learning and employers questionnaires shows that ELO has been obtained in the learning process. Moreover, all stakeholders state that ELO of Biology Study Program has met labor market requirements. However, there are several competencies that need to be improved such as English Language and alumni negotiation. It will be considered as evaluation material to develop those competencies on curriculum re-arrangement in this year.

2.1.2 The program promotes long life learning

The rapid development of science and technology needs higher human resource capacity and can adapt to changing millennium era. Based on this consideration, the BSP applies the education concept which promotes learning how to learn, lifelong learning, learning from various media with various parties competent. The program of lifelong learning is promoted and indicated by educating the young to achieve life skill competency.

Lifelong learning program embedded at curriculum based on advice from an expert, the faculty member, students, alumni and stakeholder. The programs are integrated with the teaching-learning process, academic coaching and thesis mentoring. Lecturers are mandatory to advice student on how to develop knowledge and prospective technology based on the course for solving the human problem. Moreover, the problem-based learning intended to improve the ability of long life learning of biology students through the creation of a character that is sensitive to community needs, implementing knowledge, create opportunities and be open mind.

Subjects KKN and Internship are expected to develop the student's competency to adapt in the environment, pioneer-spirited, sensitive to community needs and implement knowledge to solve existing problems. Laboratory practicum-organized in order to enhance the analytical ability, diligence, and synthesize knowledge based on observed biological phenomena. Overall the course requires students to read English books and references to improve its global competitiveness. All these competencies will support lifelong learning ability of students.

Academic supervisor always gives advice students to take courses and academic activity to develop the competencies that support their interests. So the students will more easily develop their competence and improve education according to the existing conditions in the community. The thesis mentor always guidance students on how to propose prospective activities, to implement it and disseminate the result of activity or knowledge to the public. In addition, students are involved in every activity on working groups is expected to increase its capacity to build teamwork, sharing and community building.

The developing competencies for BSP student was supporting the ability of lifelong learning that is monitored at the end of each semester and during final exams of bachelor thesis. The monitoring results are used to improve the system in each semester and curriculum improvement for every four years. The tracer studies indicated that the alumni had exquisite lifelong learning competency. It can be seen from profiles alumni who can adapt at various work and satisfaction of alumni user. Most of the alumni have become succeeded innovators, entrepreneurs and pioneers of the community on a national level, and be able to compete and excel at the international level

2.1.3 The expected learning outcomes cover both general and specialized skills and knowledge

ELO BSP is designed to provide graduates have general and special skills that are indispensable to compete in the labour market. The subject on religion and civic is expected

to develop the General skills such as the concept of nationalism, culture, norms, and religion. While Subject on Bahasa Indonesia, English and entrepreneurship is expected to improve the ability of the student to communicate with other for delivering ideas, identifying opportunities and the spirit of competition at the national and global level. Further, the subject also be expected to equip students be able to adapt on a changing environment and act as leaders and agents of change for the prosperity of society.

Compulsory and elective of biology courses including the basic computer courses is expected to equip students with skills in the fields of biology. Therefore, the student affords to understand to new knowledge, acquire and use information from Internet and another source as asset to adapt to the changing times. While the course of localism knowledge is intended to develop the ability in understanding the natural phenomena and human problems from a biological perspective, to provide basic knowledge of modern biology to comprehend, analyze and solve complicated problems in an integrated and sustainable ways. Moreover, the mandatory to write Articles in scientific journals and to conduct seminars are expected to increase of capacity for spreading ideas to the community, and to develop writing and communication skills. Overall these skills alumni are also needed by stakeholder. This condition is reflected in tracer studies stating that the alumnus's users were satisfied with the performance of the alumnus's biology.

Tabel 2.1.1 ELO 2010

Cognitive, knowledge, intellectual quotient (I)	Affective, emotional quotient (A)	Psychomotor, Skills (P)
Main Competence		
1.1 Understanding the role and contribution of Biology, student, university and graduate's role, understanding the Biology research method and scientific writing	A.1 *Scientific attitudes* (curiosity, objectiveness, rationality, critical, open minded, innovative, work hard, confidence and etc.)	P.1 Good at selecting, applying Biology research method and writing scientific report
1.2 Mastering English	A.2 Having ethics (politeness, appreciating people, keeping temper, responsibility, good listener, and etc)	P.2 Good at using English (reading, listening, speaking and writing)
1.3 Understanding the basic concept of modern Biology (*up to date*) from molecular to community, taxonomy, genetics, structure and evolution (microorganism to macroorganism)	A.3 Having *Bio-entrepreneurship* characteristics (leadership, managerial, self motivation, responsibility, taking risk, team work)	P.3 Good at operating basic computer for filling management, writing, analyzing data, preparing oral-poster presentation, *drawing objects*, *image analysis* and searching information on internet, basic algorithm
		P.4 Good at using Bioinformatics application and Computational Biology (Biostatistics analysis, *Clustering/Coordination*, Analysis of Phenetic-Phylogenetic, GIS)
Supporting Competence		
1.4 Understanding the management related to research and development: *self evaluation, planning, audit,* procedure standardization and work performance	A.4 *Personal approach* (act as the role, behave well and etc)	P.5 Good at becoming a consultant, researcher, businessman, *environmental assessment* man
		P.6 Good at conducting Bioassay
1.5 5 Understanding the market need analysis for entrepreneur start		P.7 Good at analyzing market need to start entrepreneur, marketing, promotion and entrepreneur practice

Tabel 2.1.2 Expected Learning Outcome (ELO) 2014

ELO	Knowledge Literacy	Intelectual Skill	Work Skills	Attitude	Leadership and Managerial
Main	C.U.1.Having Biology literacy and success skill		P.U.1 Good at selecting appropriate method for solving biological problems.	A.U.1 *Scientific attitudes* (curiosity, objective, rational, critical, *openminded, creative, innovative*, etc.)	L.U.1 *Bio-entrepreneurship spirit (leadership, managerial, inner motivated, responsive*, *team-work etc*.)
	C.U.2 Understanding the structure, function, & organization of life		P.U.2 Good at communicating in Indonesia and English language.	A.U.2 Social behavior (polite, honor people, responsible, etc.)	
	C.U.3 Understanding the coordination of life, regulation of growth and development , and its analysis		P.U.3 Good at operating basic computer, software application, basic instrument, standard method for application, and synthesis in Biology		
	C.U.4 Understanding the bio-scientific research and writing		P.U.4 Understanding the Bioinformatics and Computational Biology (analysis of biostatistic, *Clustering/ Coordination*, Phenetic-Phylogenetic, GIS)		
Supporting	C.P.1 Understanding the management related to *Research & Development*, procedure standard and work quality		P.P.1 Understanding the internship as consultant, researcher, entrepreneur, *environmental assessment*		A.P.1 *Personal approach* (act based on the role, *lobbying* etc.)
			P.P.2 Understanding the *Bioassay*		
	C.P.2 Understanding the market need analysis to start entrepreneurship		P.P.3 Understanding how to analyze the market need, to start etrepreneurship, marketing, promotion and entrepreneurship practice		

Table 2.1.3 ELO, Teaching Method and Evaluation

Intended Learning Outcomes	Teaching and Learning Methods	Assessment
Knowledge Literacy		
C.U.1.Having Biology literacy and success skill	Lecture, tutorial, group discussion, and expert lecture	Examination, assignment reports, oral presentation and quizzes
C.U.2 Undestanding the structure, function, & organization of life		
C.U.3 Undestanding the coordination of life, regulation of growth and development , and its analysis		
C.U.4 Understanding the bio-scientific research and writing		
C.P.1 Understanding the management related to *Research & Development*, procedure standard and work quality		
C.P.2 Understanding the market need analysis to start entrepreneurship		
Work Skills		
P.U.1 Good at selecting appropriate method for solving biological problems	Lecture, Tutorial, group discussion, laboratory works, field practical work,and guest lecture	Examination, Laboratory reports, assignment reports, oral presentation and quizzes
P.U.2 Good at communicating in Indonesia and English language		
P.U.3 Good at operating basic computer, software application, basic instrument, standard method for application, and synthesis in Biology		
P.U.4 Understanding the Bioinformatics and Computational Biology (analysis of biostatistic, *Clustering/ Coordination*, Phenetic-Phylogenetic, GIS)		
P.P.1 Understanding the internship as consultant, researcher, entrepreneur, *environmental assessment*		
P.P.2T Understanding the *Bioassay*		
P.P.3 Understanding how to analyze the market need, to start etrepreneurship, marketing, promotion and entrepreneurship practice		
Attitude		
A.U.1 *Scientific attitudes* (curiosity, objective, rational, critical, *openminded, creative, innovative*, etc.)	Lecture, group discussion, laboratory works,	Examination, Laboratory reports, assignment reports, oral presentation
A.U.2 Social behavior (polite, honor people, responsible, etc.)		
Leadership and Managerial		
L.U.1 *Bio-entrepreneurship spirit* (leadership, managerial, inner motivated, responsive, team-work etc.)	Lecture, group discussion, laboratory works, field practical work,	Laboratory reports, assignment reports, oral presentation
A.P.1 *Personal approach* (act based on the role, lobbying etc.)		