DETERMINATION OF CREDITS COURSES
PLANT BIOTECHNOLOGY

Course	CLO	CLO 1.1	Learning Methods	Study Materials	Study Hours		Sks/Credits
					T	P	
Plant Biotechnology	Able to do all tasks independently with full responsibility, able to work well with a team, and able to develop a technopreneur-ship spirit related to Agricultural Biotechnology courses	Able to explain and provide arguments regarding the regulation of genetic engineering product regulation	Face to Face, Structure Assignment, Independent Study	Discussion	7	0	0,15
		Able to explain the management of plant biotechnology laboratories in the development of commercial products for household-scale tissue culture laboratories	Face to Face, Structure Assignment, Independent Study	Plant biotechnology laboratory management in commercial product development.	7	0	0,15
		Able to explain the basic principles of technopreneurship in the field of plant biotechnology	Face to Face, Structure Assignment, Independent Study	The basic principles of technopreneurship in the field of plant biotechnology.	7	0	0,15
		Able to plan and make business plan proposals about plant biotechnology products	Face to Face, Structure Assignment, Independent Study	Proposal for Entrepreneurship Student Creativity Program Network culture for small/home industries	7	0	0,15
	Capable of applying tissue culture technology and mass-producing plant seeds and is also able to explain the process of assembling the transgenic plants	Able to explain cell biology systems, the function of DNA genetic material, and the role of plant biotechnology in improving human welfare	Face to Face, Structure Assignment, Independent Study, Practicum	1. Understanding and the underlying science of plant biotechnology. 2. The role of plant biotechnology in human life. 3. The history of the development of plant biotechnology in the perspective of the industrial world.	7	0	0,15

		Able to explain and apply mass propagation techniques in vitro	Face to Face, Structure Assignment, Independent Study, Practicum	1. In-vitro propagation technique 2. Solution and composition of tissue culture media. 3. Regeneration of explants through somatic and zygotic embryogenesis. 4. MS media creation 5. Micro propagation 6. Sub culture and acclimatization	14	7	0,56
		Able to explain tissue culture in mutation induction for formation of somaclonal variation and able to relate it to plant breeding programs	Face to Face, Structure Assignment, Independent Study, Practicum	Somaclonal variation for agricultural product development	7	7	0,40
		Able to explain the basic principles of genetic engineering (recombinant DNA) and gene isolation and cloning techniques	Face to Face, Structure Assignment, Independent Study, Practicum	1. Recombinant DNA technique 2. Genetic engineering tools 3. DNA isolation of target genes and gene cloning	14	7	0,56
		Able to identify problems of cultivated plants and design the process of genetically engineered products (GM)	Face to Face, Structure Assignment, Independent Study, Practicum	1. Biological, physical and chemical gene transformation methods 2. Research journal	14	0	0,31
		Able to explain genetic markers, DNA marker techniques and their benefits	Face to Face, Structure Assignment, Independent Study, Practicum	1. Genetic markers: morphology, cell and molecular 2. Types and techniques of molecular analysis 3. Molecular marker applications	7	7	0,40
				Total Hours	91	28	3,00
	sks/credit Theory		(Total Hours for Theory × 1 sks)/(2.83 × 16)	**SKS Theory**			2,01
	sks/credit Practicum/field work		(Total Hours for Practicum × 1 sks)/(2.83 × 10)	**SKS Practicum**			0,99

Notes: T = Theory P = Practicum/Field Work
1 SKS/Credit = 170 minutes = 2,83 hours

1 Semeter = 16 Face Times
The study time required for students to achieve CLO at each learning stage is determined by the lecturer/lecturer team based on their experience in teaching the course.
Total Course SKS/Credits = Theory + Practicum/field work