



UNIVERSITI TEKNOLOGI MARA

BMS652: PLANT AND ANIMAL BIOTECHNOLOGY

Course Name (English)	PLANT AND ANIMAL BIOTECHNOLOGY APPROVED
Course Code	BMS652
MQF Credit	3
Course Description	The subject module is intended to provide an introduction to the alternative solutions and value-added benefits offered by biotechnology to the Agriculture sector. The students are not expected to be technically competent in the various areas discussed, but should be aware of the potential use of biotechnology in providing alternative, environmental-friendly, cost-effective and sustainable solutions to various issues face in Agriculture. The module introduces students to the use of genetically manipulated plants and animals and their potential applications. Among other topics discussed will be the use of biological control agent as an alternative to pesticides, biofertilizers, molecular markers and also the social and ethical issue of GMO/ biotechnology.
Transferable Skills	able to perform tissue culture and microbiological technique in their own business or working environment.
Teaching Methodologies	Lectures, Blended Learning, Lab Work
CLO	CLO1 Illustrate the concern of pros and cons with regard to GMO and principles and applications of biological control agents and bio-fertilizers in agriculture. CLO2 Demonstrate social communication skills in a group task to examine the current practices in plant propagations and animal breeding methods in Malaysia. CLO3 Perform laboratory experiments on tissue cultures and biological controls.
Pre-Requisite Courses	No course recommendations
Topics	
1. 1.0 Plant Tissue Culture 1.1) Concept of totipotency, terms used in plant tissue culture (plasticity, explants, micropropagation), the culture environment, plant cell /tissue culture media and plant growth regulators. 1.2) Culture types and uses- callus, cell suspension cultures, protoplast, root cultures, shoot tip and meristem cultures, embryo culture, and microspore culture . 1.3) Plant regeneration – somatic embryogenesis and organogenesis 1.4) Integration of plant tissue culture into plant transformation protocols	
2. 2.0 Techniques and genetic manipulation of plants 2.1) Methods for introducing DNA into plants- indirect methods (particle bombardment, Polyethylene glycol, (PEG) electroporation, silicon carbide fibers etc) and direct method (Agrobacterium-mediated gene transfer) 2.2) Plant transformation – basic features of vectors for plant transformation. 2.3) - Applications of genetic manipulation in agriculture - using examples / case studies on herbicide resistance, pest resistance, disease resistance, reduce the effect of viral disease, stress tolerance, improve crop yield and quality, molecular pharming. 2.4) Bioethics – concern about GM crop (antibiotic resistance genes, herbicide resistance and “superweeds” gene contaminant, big business) and the regulations of GM crop and products.	
3. 3.0 Animal biotechnology 3.1) Introduction to animal in research – animal model, alternative to animal models and ethics and regulations of animal research. 3.2) Animal propagation- artificial insemination, clones (nuclear transfer technology) 3.3) Transgenic animals – transgenic techniques, agriculture products with transgenics and animals as bioreactor	

4. 4.0 Biological control agents

- 4.1) Concept, principles and terms of biological control.
- 4.2) Types of biological control
- 4.3) Procedures for biological control
- 4.4) Applications and examples of biological control programs.

5. 5.0 Biofertilizers

- 5.1) Introduction -Nitrogen fixation
- 5.2) Symbiotic bacteria - Cyanobacteria, Azospirillum
- 5.3) Mycorrhiza - Ectomycorrhiza & Endomycorrhiza

6. 6.0 Types of molecular markers

- 6.1) Use of molecular markers for breed stock management and biodiversity

Assessment Breakdown	%
Continuous Assessment	50.00%
Final Assessment	50.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Group assignment	20%	CLO2
	Group Project	Mini project/Proposal	20%	CLO3
	Test	Test	10%	CLO1

Reading List	Recommended Text	<ul style="list-style-type: none"> Adrian Slater, Nigel W. Scott, Mark R. Fowler 2008, <i>Plant biotechnology</i>, Third Ed., 6,7,12, Oxford University Press, USA [ISBN: 0199282617]
	Reference Book Resources	<ul style="list-style-type: none"> Heiner Niemann, Christine Wrenzycki 2018, <i>Animal Biotechnology 1</i>, Springer [ISBN: 3319923269]

Article/Paper List	This Course does not have any article/paper resources
Other References	This Course does not have any other resources