



UNIVERSITI TEKNOLOGI MARA

AGR516: PLANT BREEDING

<b>Course Name (English)</b>	PLANT BREEDING <b>APPROVED</b>
<b>Course Code</b>	AGR516
<b>MQF Credit</b>	3
<b>Course Description</b>	This course will engage students cognitively and scientifically in major crops of plant breeding. Genetic principles, tools of the breeder, breeding methods, cultivars maintenance and protection, biotechnology aspect and germplasm. Students will perform investigations through fieldwork, verbally and in writing. Lecture sessions employ a mixture of lectures and discussions. The outcomes shall be assessed through discussion, test, assignment and final examination.
<b>Transferable Skills</b>	Knowledge of plant breeding application in crop improvement
<b>Teaching Methodologies</b>	Lectures, Case Study, Problem Based Learning (PBL), Discussion
<b>CLO</b>	CLO1 State, write and explain the concepts and fundamental of plant breeding CLO2 Explain verbally, technically and visually relate and discuss the practices and procedures for plant breeding of major crops in Malaysia. CLO3 Evaluate and apply the standard regulations and legislation in cultivar plant breeding maintenance and protection
<b>Pre-Requisite Courses</b>	No course recommendations
<b>Topics</b>	
<b>1. Introduction to Plant Breeding</b> 1.1) Definitions of plant breeding 1.2) Origin of plant breeding (history) 1.3) Plant breeding in Malaysia (current) 1.4) Identification of Plant reproductive part and floral biology	
<b>2. Gene Recombination in Plant Breeding</b> 2.1) Variation, the basis of plant breeding 2.2) The mechanism of Mendelian heredity 2.3) Gene recombination following hybridization 2.4) Gene structure and action	
<b>3. Quantitative Inheritance in Plant Breeding</b> 3.1) Quantitative Inheritance and its measurement 3.2) Multiple Alleles 3.3) Types of gene action 3.4) Heritability 3.5) Selection Intensity and genetic advance 3.6) Gene Frequency and genetic equilibrium 3.7) Gene recombination and plant breeding	
<b>4. Variation in Chromosome Numbers</b> 4.1) Define the terms polyploidy, euploidy, aneuploidy and haploids 4.2) Variation in chromosome number in plants 4.3) Effect of polyploidy on plants 4.4) Application of aneuploidy	
<b>5. Mutation</b> 5.1) The nature of Mutation 5.2) Induction of mutation 5.3) Role of Mutation in Breeding	

<p><b>6. Fertility-Regulating Mechanisms and Their Manipulation</b></p> <p>6.1) Discuss the use of male sterility and self-incompatibility in breeding.</p> <p>6.2) Benefit of Apomixis</p> <p>6.3) Interspecific Hybridization</p>
<p><b>7. Biotechnology and Germplasm Resources</b></p> <p>7.1) Define the term biotechnology and germplasm resources</p> <p>7.2) Clonal propagation by tissue culture</p> <p>7.3) Somatic cell hybridization</p> <p>7.4) Plant genetic engineering</p> <p>7.5) Germplasm resources and conservation</p> <p>7.6) Plant Genetic Resources utilization</p>
<p><b>8. Breeding Self - Pollinated Crops</b></p> <p>8.1) Define the term of variety and cultivar</p> <p>8.2) The genetic significance of pollination method</p> <p>8.3) Methods in self pollinated</p> <p>8.4) Distinguish the advantage and disadvantages of breeding self pollinated method</p>
<p><b>9. Breeding Cross-Pollinated and Clonally Propagated Crops</b></p> <p>9.1) Cultivar development in cross pollinated species</p> <p>9.2) Recurrent selection</p> <p>9.3) Population structure</p> <p>9.4) Progeny VS combining ability test</p> <p>9.5) Mass selection</p> <p>9.6) Half sib selection</p> <p>9.7) Breeding clonally propagated species</p> <p>9.8) Hybridization in clonally propagated species</p>
<p><b>10. Breeding Hybrids or Cultivar</b></p> <p>10.1) Inbreeding</p> <p>10.2) Hybrid vigor and Heterosis</p> <p>10.3) The differentiate between single crosses and double crosses</p> <p>10.4) Cytoplasmic male sterility</p> <p>10.5) Procedure in hybrid seed production</p>
<p><b>11. Techniques in Breeding Fields Crops</b></p> <p>11.1) The differences between selfing and crossing</p> <p>11.2) Techniques in hybridization</p> <p>11.3) Field trials</p>
<p><b>12. Molecular Breeding</b></p> <p>12.1) Molecular Markers</p> <p>12.2) Mapping of Genes</p> <p>12.3) Marker Assisted Selection</p>

Assessment Breakdown	%
Continuous Assessment	60.00%
Final Assessment	40.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Students needs to examine, write, explain and discuss the information related with the concepts and fundamental of plant breeding	20%	CLO1
	Discussion	Student need to discuss and write report related with the materials, procedure, finding and conclusion related with the task given.	20%	CLO2
	Test	The questions will be constructs to test student knowledge towards concept and fundamental in plant breeding	20%	CLO1

<b>Reading List</b>	<b>Recommended Text</b>	• John Milton 2006, <i>Breeding Fields Crops</i> , Blackwell Publishing
<b>Article/Paper List</b>	This Course does not have any article/paper resources	
<b>Other References</b>	This Course does not have any other resources	