



UNIVERSITI TEKNOLOGI MARA

AGC702: MOLECULAR ENTOMOLOGY

Course Name (English)	MOLECULAR ENTOMOLOGY APPROVED
Course Code	AGC702
MQF Credit	3
Course Description	Provides a broad perspective on the molecular biology of insects and a specific focus on aspects relating to the transmission of insect-borne diseases. Also provides an introduction to insect physiology, developmental biology, genomics and molecular evolution and ecology. Includes several modules addressing molecular mechanisms implicated in insect – host and insect - pathogen interaction, which are essential for disease transmission. Provides background information on essential methodologies used in molecular entomological research and discusses the importance of molecular entomology for the development of disease control strategies. The basic developmental, genetic and genomic focused modules utilize the wealth of knowledge gained from studies in the model insect organism <i>Drosophila</i> , while modules focusing on insects' role in disease transmission focus on the mosquito vector of malaria <i>Anopheles</i> .
Transferable Skills	student will be able to verify, assess & employ the concept, theories in molecular entomological research and discusses the importance of molecular entomology
Teaching Methodologies	Lectures, Discussion
CLO	CLO1 state, write and explain concept in molecular with emphasis on the gene structure and expression techniques CLO2 verbally, visually (pictures, structure & shape) and relate as well as discuss molecular basis and general model for sex determination in insects CLO3 able to verify, assess & employ the concept, theories in molecular entomological research and discusses the importance of molecular entomology for the development of disease control strategies CLO4 able to observe, plan, and conduct analysis of insect behaviour by using traditional methods and molecular methods and discuss the mapping genes of complex behaviours CLO5 able to collaborate, motivate and truthful with group members in the laboratory, fields and in the lecture room
Pre-Requisite Courses	No course recommendations
Topics	
1. 1.0 Introduction to eukaryotic invertebrate genome 1.1) 1.1 Emergence of genome studies 1.2) 1.2 Gene structure and expression 1.3) 1.3 Cytogenetic organization 1.4) 1.4 Genetic elements and sequence level organization 1.5) 1.5 Genetic and physical mapping	
2. 2.0 Molecular systematics, evolution and genetics of insect population 2.1) 2.1 Insect molecular systematic and evolution 2.2) 2.2 Molecular genetics	
3. 3.0 Improving virulence of biological control agents of pest insects 3.1) 3.1 Host-specificity and alternative host ranges 3.2) 3.2 Strain selection 3.3) 3.3 Genetic engineering of biological control agents 3.4) 3.4 Applications in IPM	

4. 4.0 Transfection of plants with insecticidal genes for control of cro

- 4.1) 4.1 Vectors
- 4.2) 4.2 Applications for plant improvement
- 4.3) 4.3 Applications in IPM
- 4.4) 4.4 Molecular mechanisms for pesticide resistance

5. 5.0 Sex determination in insects

- 5.1) 5.1 Molecular basis for sex in *Drosophila melanogaster*
- 5.2) 5.2 General model for sex determination in insects
- 5.3) 5.3 Meiotic drive, cytoplasmic distorters and hybrid sterility

6. 6.0 Insect vector competence of pathogens

- 6.1) 6.1 Biology
- 6.2) 6.2 Pathogen genetics
- 6.3) 6.3 Vector genetics

7. 7.0 Molecular genetics of insects behavior

- 7.1) 7.1 Insect central nervous system
- 7.2) 7.2 Analysis of behaviour by traditional methods and molecular methods
- 7.3) 7.3 Mapping genes of complex behaviors
- 7.4) 7.4 Transgenic insects
- 7.5) 7.5 Transformation methodologies and target

Assessment Breakdown	%
Continuous Assessment	70.00%
Final Assessment	30.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Participation in class based on discussion on the topics	5%	CLO5
	Assignment	Report Assignment	15%	CLO3
	Assignment	Video Presentation	20%	CLO2
	Test	Written test	30%	CLO1

Reading List	Recommended Text	P. D. Josephy; B. Mannervik and P. O. de Montellano. 1997, <i>Molecular Toxicology.</i> , Oxford University Press.
	Reference Book Resources	<ul style="list-style-type: none"> Hagedon HH, Hilderbrand JG, Kidwell MG & Law JH. 1990, <i>Molecular Insect Science</i>, Plenum Press, New York Oakeshott J & Whitten MA. 1994, <i>Molecular Approaches to Fundamental and Applied Entomology.</i>, Springer Verlag
Article/Paper List	Recommended Article/Paper Resources	T. M. Brown, Ed 1996, .Molecular genetics and evolution of pesticide resistance., ACS Symp. Ser. 645.
	Reference Article/Paper Resources	Ed. Mullin & Scott 1992, Molecular Mechanisms of Insecticide Resistance. Diversity among insects, <i>ACS Symposium series 505</i>
Other References	This Course does not have any other resources	