**DEPARTMENT OF ENTOMOLOGY, IUB, BAHAWALPUR**

COURSE CONTENTS AND TENTATIVE PLAN Spring 2020

Course Tittle: Insect Molecular Biology

Course Code: ENT-708

Credit Hours: 3(2-1)

Instructor: DR. SAJJAD ALI

Email: sajjad.ali@iub.edu.pk

DESCRIPTION & OBJECTIVES

To provide the modern concepts of molecular Entomology and its applications.

READINGS

1. Gilbert, L. 2005. Comprehensive Molecular Insect Science. 1-7 Vol.
2. Glick, B.R. and Pasternek, J.J. 1998. Molecular Biotechnology: Principles and Applications of Recombinant DNA. ASM Press. Washington D.C.
3. Hall, B.G. 2007. Phylogenetic Trees Made Easy: A How-to Manual. 3rd Ed. Sinauer Associates.
4. Handler, A. M. James, A.A. (Eds.).2004. Insect Transgenesis: Methods and Applications, Comprehensive review of insect gene transfer, its methodologies, applications and risk assessment and regulatory issues. CRC Press.
5. Alfred M. Handler, Anthony A. James.2000. Insect Transgenesis: Methods and Application. CRC Press.
6. Hoy, M.A.2013. Insect Molecular Genetics: An Introduction to Principles and Applications, Academic Press. 3rd Edition
7. Glick BR, Pasternak JJ and Patten CL 2009, Molecular Biotechnology: Principles and Applications of recombinant DNA. ASM Press Publishers. 4th edition.
8. Walker JM and Raply Ralph 2009. Molecular Biology and Biotechnology Royal Society of Chemistry Publishers.
9. Smith JE 2009. Biotechnology. Cambridge University Press; 5 edition
10. Acquaah G 2003. Understanding Biotechnology: An Integrated and Cyber-Based Approach. Prentice Hall; 1 edition.
11. Gray, J. Blomquit, Richard. 2003. Insect pheromone biochemistry and molecular biology, Elsevier Academic.

CONTENTS

**THEORY:**

1. Introduction; Insects as a model for molecular study (Drosophila, Red flour beetle, Mosquitoes, Honeybee).
2. Insect genomes; nucleus, chromosomes, DNA and RNA; Gene structure and function; gene transcription and translation; concept of introns and exons; central dogma of molecular biology.
3. Primer Design and polymerase chain reaction (PCR),
4. Gene cloning and sequencing; restriction analysis, gene libraries;
5. Mitochondrial and genomic DNA for insect species identifications and insect population diversity and bio-typing
6. DNA for phylogenetic analysis and construction of phylogenies
7. RAPD, RFLP, PCR-RFLP analyses
8. Gene linkage and chromosomal mapping,
9. Genes regulatory processes and mutagenesis
10. Molecular basis of insect functions (insect behavior, insecticidal resistance), gene knock-ins and knock-outs by RNA interference and DNA barcoding
11. DNA and protein sequence alignments and use of bioinformatics tools.

**PRACTICAL:**

1. Demonstration of insect DNA extractions
2. DNA PCR amplification,
3. Gel electrophoresis
4. Gene cloning and plasmid DNA extractions,
5. DNA hybridization (Southern and northern blots);
6. RAPD, RFLP analysis techniques,
7. Use of Bio-Informatics software tools

COURSE SCHEDULE

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| Week | Topics and Readings | Details |
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ASSESSMENT CRITERIA

**Theory**

Sessional + Assignments: 12

Mid Exam: 18

Final exam: 28

**Practical**

Lab performance + Presentations+ Sessional 06

Practical Written exam: 16

**Total 80**

RULES AND REGULATIONS

80% class attendance

Class participation in presentations and discussions