Course plan for ZOL304MC3 2016/17- Molecular biology part

Course title	Molecular Biology and Immunology
Course code	ZOL 304 MC3
Credit value	03 (33 hours Lectures and 36 P+F) **[covering 50% here= 16h L and 18h P]**
Prerequisite	Should have followed the Introductory Molecular Biology ZOL321GC2
ILO	Understand the structural and functional variations of gene in different cell types Identify and characterize Mutations and their kinds Characterize functional and structural Genomes and proteomes Evaluate and apply different molecular biology techniques and tools
Course content	**Molecular Biology** \Molecular structure and function of genes; Gene expression –prokaryotic and eukaryotic; Regulation of gene expression: regulation at the level of transcription, positive and negative, inducible and repressible; Regulation of gene expression – chromatin modulation and RNAi; Post transcriptional regulation; Mutations: transitions, transversions, spontaneous, induced, samesense, missense, nonsense; DNA damage and repair (types of DNA damage and DNA repair mechanisms) DNA repair mechanisms; Genomes, Transcriptomes and Proteomes, Genome Sequence and Genomes Function- NGS; Mapping gene structure: Identification of specific DNA sequences, Identification of gene expression; Recombinant DNA technology (principles and application), Gene transformation and techniques: transposable elements, transgenic animals; Ethics in gene transformation and transgenic animals; Bioinformatics: tools and applications. Basic methods in molecular biology: Molecular cloning methods, polymerase chain reaction-PCR PCR (basic principles and primer design), PCR cloning e. DNA libraries; DNA sequencing; Cloned genes applications: microarrays, RT-PCR, qPCR, hybridization of nucleic acids (Northern blotting and Southern blotting).
Teaching and learning methods	Lecture presentation , tutorial discussion, Student presentations, laboratory based experiments, take-home and library assignments

Course plan **Theory**	**Lecture 1-** Recalling their learning in DNA and other bio molecular structures – interactive session with questions and answers. Group discussion on common topics **L2-** Recall the gene expression and the implications- interactive session with questions and answers. Group discussion on common topics **L3 and 4-** Transcriptional level differences among prokaryotic and eukaryotic expression – lectures and assignment (library based): **ICA 1** **L5 and 6-** Translational level differences among prokaryotic and eukaryotic expression – lectures **L7,8 and 9-** RNA splicing – recall and detailed lectures with the help of videos and animations to explain the molecules involved in the mechanisms and their role **L10-** Quiz exam- **ICA2** **L11 and 12-** Mutations and DNA damage and repair- Introducing the terms and process with mechanism from selected example or type- lectures; interactive session with questions and answers. Group discussion on common topics **L13-** Introducing genomes and proteome world- lectures **L14 and 15-** Identify the uses of the knowledge in molecular biology- Home prepared presentation will be done by students: Skill development- Reading and independent learning; presentation skill be evaluated and feedback given by peers and resource persons **L16 and 17-** Recalling the principles behind PCR, sequencing, electrophoresis and introducing bioinformatics and their uses- lectures ad discussion **L18-** Tutorial discussion
Practical	**Session 1 - Lab safety – identify the issues in the molecular lab:** Students will be given introduction about lab safety, specifically I molecular biology labs. Then they will be asked to identify safety related issues in the current lab and submit a report based on this. This will be a continuous assignment which will be marked. They will also be learning sterilization techniques **Session 2- and 3 – DNA extraction** Students should identify different DNA extraction techniques based on literature survey. They will prepare extraction buffer for ethanol based extraction method. In next session they will start DNA extraction based on available protocols. **Session 4 and 5- PCR and trouble shooting** Students will do a PCR with available primers to amplify DNA portion and there will be an

	ICA (On spot marking) **Session 6- Gel electrophoresis and Restriction digestion** Students will be preparing agarose gel and do electrophoresis to check their PCR amplification. **Session 7 – Bio informatics** Students will be doing basic bio informatics analysis such as sequence editing and alignment. They will be introduced the use of different models and programmes for construction of phylogeny trees. They will use installed as well as online freeware.
Evaluation Methods	Theory: In-Course Assessments (30%) End of Course Examination (70%) Practical: In-Course Assessments (30%) End of Course Examination (70%) marks obtained in theory component (MT) and practical component (MP) will be computed into Overall Marks as (6MT+4MP)/10
ECE Exam blue print	The ECE (Theory) will have two questions from any of the following sections; • Gene expression differences in different cells • Types of RNSs and their implications • Mutations • DNA damage and repairing mechanism in selected example • Molecular biology techniques and current popular programmes Practical ECE will be with 4-5 questions with different mark weightage covering all the sessions with hands on experiment which will be assessed on spot. The other questions may include identification, spotting, comment and critique.
References	• Brown, T.A. (2002).Genomes. 2nd edition. Oxford Wiley Press, UK • Robert Shlief. (1993). Genetics and Molecular Biology. Second edition. Johnm Hopkins University Press, USA
Resource person	Dr.K.Gajapathy (Molecular Biology)

Sgd
Gajapathy K