

TCIS, Hyderabad

Course: Molecular genetics

Start Date: 14/08/2017

Coordinates (Preferred):

Instructor: Manish Jaiswal

Syllabus:

- Model organisms
 - Introduction to various models used for genetics studies
- Principles of genetics
 - Patterns of Inheritance
 - Mutations and phenotypes
 - Exception to Mendelian inheritance
- Genome organization and genetic mapping
 - Linkage and recombination
 - Genetic mapping in model organism
 - Methods for genetic and molecular mapping
- Regulation of gene expression
 - Regulation of transcription, alternative splicing, and translation
 - Gene expression regulation in the Eukaryotic and prokaryotic system
 - Epigenetic mechanisms such as imprinting
 - The epigenetic mechanism in development and diseases
 - Discovery tools to study gene regulation and epigenetics mechanisms
- Genetics to study biological processes and diseases
 - Methodologies used for genetic manipulation
 - Forward and reverse genetics
 - Dissection of gene function and genomics
 - Genetics to study development
 - Genetic regulation of behavior
 - Genetics and evolution
 - Detecting human disease alleles: molecular genetic diagnostics
 - Model organisms in understanding human genetic diseases

Primary Text / Reference Books:

- An Introduction to Genetic Analysis by Anthony J. F. Griffiths.
- Genetics: A Conceptual Approach by Benjamin Pierce.
- Mechanisms of Gene Regulation by Carsten Carlberg and Ferdinand Molnár
- Human Molecular Genetics by Tom Strachan and Andrew Read.
- Genetic Mapping in Experimental Populations by J. W. Van Ooijen and J. Jansen.
- Elements of Evolutionary Genetics by Brian Charlesworth and Deborah Charlesworth.
- Genome Editing by Kursad Turksen.
- Targeted Genome Editing Using Site-Specific Nucleases: ZFNs, TALENs, and the CRISPR/Cas9 System by Takashi Yamamoto.

Evaluation Method (Weightage for Internal Assessment, Mid Term / Term End exams, Presentations etc.): Mid-term (20%), Final exam (30%), Case studies/assignment (30%), Presentations (20%). In the case studies students will be expected to design genetic strategies to resolve a hypothetical or a real problem. In the presentation, the students will present a recently published work or a classic work based on genetics approach.