

ZOS455: MOLECULAR CELL BIOLOGY

Teaching Hours 10/Unit

COURSE OUTCOME

1. Structural organization of the cell and functioning of different cell organelles are taught.
2. Types of cell divisions in organisms and their scientific relevance is to be studied.
3. Student will gain an understanding of chemical and molecular processes that occur in and between cells.
4. In molecular biology, aspirant learns about how molecules interact within the cell to promote proper growth, division, and development.
5. This course will emphasize the molecular mechanisms of DNA replication, repair, protein synthesis.
6. At the end of this course students should be excited about basic science and its applications and gain higher level thinking skills that is necessary for scientists.

UNIT I

Introduction: Historical highlights, Cell theory, Organization of prokaryotic and eukaryotic cells. DNA as a data storage medium, C-value paradox, Evidences for DNA as genetic material transformation experiment. Structure of DNA and RNA, Replication of DNA in prokaryotes and eukaryotes. Transcription in prokaryotes and eukaryotes, RNA processing, Spliceosomes. Translation in prokaryotes and eukaryotes.

UNIT II

Molecular composition and models of membrane architecture – Davson – Danielli model, Fluid mosaic model, cell-cell adhesion, Cell Junctions. Transport across cell membrane – Diffusion and Active transport. Cell-cell signalling – cell surface receptors, second messenger system signalling from plasma membrane to nucleus, signal transduction.

UNIT III

Structural organization of nucleus and nucleolus. Morphology and functional elements of eukaryotic chromosomes-Centromere, nuclear organizers, Telomere, heterochromatin and Euchromatin. Molecular organization of chromatin, Nucleosome model. Structure and functions of Endoplasmic Reticulum and Golgi Complex.

UNIT IV

Cell-cycle and Cell division: Phases of cell-cycle, Cyclins and Cyclin dependent kinases. Regulation of Cdk-cyclin activity. Molecular aspects of cell division, Meiotic division and genetic recombination. Mitotic poisons. Biology of ageing, Apoptosis – definition, mechanism and significance.

UNIT V

Microscopy – Bright and dark field microscopy, Phase contrast, Confocal, Two photon, Scanning & Electron microscopy. Staining techniques for the localization of proteins and carbohydrates. Southern, Northern and Western blot techniques, DNA finger printing, Fluorescent InSitu Hybridization (FISH). Polymerase Chain Reaction and DNA sequencing

REFERENCES

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MANGALORE UNIVERSITY

REPORT On the WETLAB CHAMPIONSHIP

An online certificate internship programme was held for 15 days during February –March 2021. This programme had online classes of 90 minutes by resource persons Dr. Pallavi, Dr. Premraj and Mr. Naveen.

28 students participated actively and were benefited in the field of molecular techniques like:

- The basic techniques used in the isolation of DNA and RNA from different sources,
- Purification of DNA and RNA
- Amplifying specific gene sequences
- Gel electrophoresis
- Isolation of plasmid DNA
- Application of these basic techniques in clinical medicine

They were evaluated by regular assignments they submitted and a final online examination held on March 11, 2021. E-certificates were issued and following top four students' were selected for the final round at IIT Khagpur and to have wetlab experience at IIT Kharagpur:

- 1) Gaana Rukmini S M
- 2) Shuaib
- 3) P PallaviPrabhu
- 4) Poovamma C.D

Overall students got an experience over molecular and forensic techniques.

The following students from different streams of life science had participated in the programme

Name	E-mail Id	Institution	Programme
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