



MC206 August-December 2:0

RNA Biology

Instructor

Prof. Saumitra Das and Dr. Saibal Chatterjee.
Email: sdas@iisc.ac.in, saibal@iisc.ac.in

Teaching Assistant

Mr. Bharat Bhatt
Email: bharatbhatt@iisc.ac.in

Department: Microbiology and Cell Biology

Course Time: Monday and Wednesday, 12-1pm

Lecture venue: MCB lecture hall

Detailed Course Page: Details described here only

Announcements

RNA BIOLOGY

[MC 206 (Aug) 2:0]

Mondays and Wednesdays, 12pm-1pm

MCB Lecture Hall

Brief description of the course

The course teaches the basic concept on RNA and introduces to recent advances in the field of RNA Biology.

We start with the concept of RNA world, basic mechanism of RNA synthesis (transcription), different RNAs

and their functions, post transcriptional modification, Structure and Catalytic functions of RNA,

Then move on to translation and translational control mechanisms, post translational modifications,

Ribosomes, rRNA modifications and heterogeneity of ribosomes, RNA-protein interactions. RNA

interferences.

Finally we discuss the role of RNA in pathogenesis, RNA as drug target and potential use of RNA in therapeutics.

Course comprises of lectures by instructors, few guest lectures by other experts and presentation by students

on recent advances.

Guest lectures by: Prof. C.Durga Rao, Dr. Purusharth Rajyaguru, Dr. Sandeep Eswarappa and Tanweer Hussain

Prerequisites

Basic knowledge in Molecular Biology

Syllabus

A basic concept on the Biology of RNA with primary emphasis on eukaryotic systems. Concept of RNA world; Types of RNA, chemical aspects of RNA and its building blocks; Transcription mechanisms, coupled transcription and post transcriptional processing: splicing & polyadenylation; Post-transcriptional control mechanism; RNases and inhibitors, Discovery of basic molecular mechanisms from study of RNA viruses, RNA structure and prediction, evolution of RNA sequences RNA editing, Ribozymes; RNA binding proteins, RNA-protein recognition and interactions; Non-coding RNAs: structure and function, RNA interference: siRNA and miRNAs; Role of RNA in protein biosynthesis; Translational control of gene expression, Ribosome, rRNA modifications and ribosome heterogeneity, Nuclear and Mitochondrial translation, Long non coding RNAs, tmRNAs, RNA viruses: regulation of gene expression; RNA in pathogenesis, its potential use as a drug target as well as its use as a drug.

Course outcomes

Basic knowledge of RNA and update with advanced concepts in RNA Biology, which will help students in understanding the regulation of gene expression at different levels. Students working in the area of RNA Biology will be specifically benefited with this comprehensive course contents.

Grading policy

40% mid-term, 10% assignments, 50% for final

Assignments

Presentations on recent advances in the field of RNA Biology

Resources

Books:

The RNA World, Third Edition - CSHL Press

RNA Worlds: From Life's Origins to Diversity in Gene Regulation-CSHL Press

Reviews:

Quinn JJ, Chang HY. Unique features of long non-coding RNA biogenesis and function. *Nat Rev Genet.* 2016 Jan;17(1):47-62. doi: 10.1038/nrg.2015.10. Review.

Engreitz JM, Ollikainen N, Guttman M. Long non-coding RNAs: spatial amplifiers that control nuclear structure and gene expression. *Nat Rev Mol Cell Biol.* 2016 Dec;17(12):756-770. doi: 10.1038/nrm.2016.126. Epub 2016 Oct 26. Review