

## First Course Sheet - BSE311

1. Objectives: Cells are the fundamental units of living organisms. This course aims at providing an introduction to the experimental methods used to discover the molecular mechanisms by which cells grow, differentiate into specific tissues and regulate their functions. Greater emphasis will be on the fundamentals of molecular biology and to develop skill sets for reading and understanding scientific literature and interpreting experimental data.

All the topics will be taught from the perspective of experimental methods used to discover the principles. For examples, instead of asking “in which order general transcription factors are recruited to the promoter?”, you should ask, “how was the order of recruitment of general transcription factors to the promoter was determined?”

2. Prerequisites: There is no obligate pre-requisite for this course. However, I would expect that students would have clear understanding of the courses taught earlier e.g. LIF101, Biotechnology and Biochemistry. Whereas, BSBE students would have credited these courses by the fourth semester anyway, students from other departments will be required to quickly pick up **relevant contents of Biotechnology and Biochemistry** courses.

3. Course Contents:

Topic	No. of Lectures
Molecular Genetic Techniques and Genomics: Genetic analyses of mutations to identify and study genes; DNA cloning and characterization; Genome wide analyses of gene structure and gene expression; Inactivating the function of specific genes in eukaryotes; Identifying and locating human disease genes	9
Molecular Structure of Genes and Chromosomes: Chromosomal organization genes and non-coding DNA; Mobile DNA; Structural organization of eukaryotic chromosomes; organelle DNAs	5
Transcriptional Control of Gene Expression: Eukaryotic gene control and RNA polymerase; regulatory sequences in protein coding genes; activators and repressors of transcription; mechanism of transcription activation and repression.	9
Post-transcriptional Gene Control: Processing of eukaryotic pre-mRNA; transport across nuclear envelope; cytoplasmic mechanism of post-transcriptional control; processing of rRNA and tRNA, regulation of protein synthesis.	7
Cell signalling: Signalling molecules and cell surface receptors; intracellular signal transduction; G protein coupled receptors	3
Membrane trafficking: Translocation of secretory proteins across the ER membrane; protein modifications, folding and quality control in the ER; export and sorting of proteins.	5
Eukaryotic cell cycle: Biochemical and genetics studies on cell cycle; mechanisms regulating mitotic events; meiosis - a special type of cell division.	4
<b>Total lectures</b>	<b>42</b>

4. Special Emphasis: (optional): Experimental methods and logic of experimental design. Students are strongly encouraged to attend all classes. To do well in the course, students will need to study the prescribed text book and are advised to refer to a variety of internet based resources to understand the topics with clarity.  
Examples of such resources will be mentioned in the class and will be communicated via group email.

The exam papers, quizzes and assignments will have questions (at least 50%) requiring students to design experiments. Multiple choice questions will have 50% negative marking and are unlikely to form more than 20% of the aggregate.

5. Lecture, Tutorial & Lab Schedule & Venue – There is no tutorial or lab for this course. The lectures will be held at **BSBE Seminar Hall**.

LEC: MF 08:00-09:00 BSBH; T 09:00-10:00 BSBH

6. Office Hours: or, recommended mode of contact beyond formal contact hours – I should be available in the afternoon of everyday other than Tuesday. However, the best method would be contacting me over email to seek an appointment. I will be willing to offer extra classes for problem solving. The students will be required to come up with the date and time for such classes.
7. Evaluation Components & Policies: Exams, Quizzes, Assignments, Attendance, Participation etc. – There will be NO CREDIT for attendance. Attendance is purely voluntary however, one should note that without attending classes it may be very difficult to answer examination questions.

There would be a minimum of 2 quizzes (one before the midsem and one after) and 4 assignments (two before the midsem and two after) apart from midsem and endsem examinations.

Quizzes (collectively) and assignments (collectively) will have 20% weightage each while the midsem will have 25% weightage and the endsem 35%. Knowledge of portions covered before the midsem may be required to answer endsem questions.

8. Course Policies: Attendance, Honesty Practices, Withdrawal (within the limits of DOAA Guidelines) – As mentioned above attendance is purely voluntary. No stipulation would be there.

Adoption of dishonest practice by one student, adversely affects the class. Thus, I take honesty very seriously. If I get proof of dishonest practices in assignments or quizzes or exams, strict action will be taken.

For the first offence 10% of the “Full Marks” for that particular component will be deducted irrespective of the marks obtained and/or questions attempted by the student. For example, if an assignment has 100 points and I find evidence of dishonest practice first, there will be no credit for the particular question(s), in addition I will deduct 10 points, which may mean up to 2 point deduction from the aggregate.

If there is a second instance, I will refer the case to S-SAC for appropriate action as per institute rules.

**Special note for assignments – Since assignments are to be solved at home/hostels the following policy will be adopted to prevent dishonest practices:**

**First, please declare – ON THE ASSIGNMENT SHEET – if you have solved the problem in a group and if so, the members of the group should be clearly mentioned in the assignment submitted.**

**With this declaration, I would overlook very similar language in answers. One should know nonetheless, that copying more than SEVEN CONSECUTIVE WORDS from any source is**

considered plagiarism. However, only for the sake of the assignments solved in a group, I will ignore this guideline.

Second, if you have participated in solving an assignment, I would assume that you understood how the problem was solved. I may – RANDOMLY – pick answers from one/few student(s) and ask him/her/them to explain the answer(s) in the class. Failure to do so will be taken as an evidence of dishonesty and the policy described above will be followed.

9. Books & References: Properly Formatted along with listing of possible internet sources.

**Textbook** - Molecular Cell Biology, by Lodish et al (5<sup>th</sup> edition or recent), W.H. Freeman and Company, New York

**Reference book** - Molecular Biology of the Cell, by Alberts et al (4<sup>th</sup> edition or later), Garland Sciences, New York

**Reference material** – Various internet sites (students will be informed) and review articles and original research articles (rarely) which will be supplied to the students on course website.