

|                                |                           |          |          |          |          |
|--------------------------------|---------------------------|----------|----------|----------|----------|
| <b>BIT11003</b>                | <b>Life Sciences</b>      | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>Version 1.0</b>             | <b>Contact Hours - 45</b> | <b>3</b> | <b>0</b> | <b>0</b> | <b>3</b> |
| <b>Pre-requisites/Exposure</b> | <b>Class 12 Biology</b>   |          |          |          |          |
| <b>Co-requisites</b>           | <b>-</b>                  |          |          |          |          |

### Course Outcomes:

**CO1.** Explain the structure and functions cell organelles and their interrelationship  
**CO2.** Analyze the genetic switches and evolutionary dynamics of living system

**CO3.** Determine the mode of transport of molecules in biological system numerically

**CO4.** Contrast between the different networks of human body and other physiological systems and can summarize consequences of physiological disorders.

**CO5.** Choose different techniques of medical biotechnology on human body to analyze the malfunction of different human system during diseased conditions.

### Course Description:

Cell is the structural and functional unit of living organism, it is well known throughout the universe, but mystery the molecular mechanism for performing the different kinds of functions of cell organelle (along with their development in both plant and animal system) and their integration into a beneficial outcome for living organism and as well as the outcome of physiological responses is almost unknown. So the course consists of structure function relationship of cell organelles, trafficking of different molecules between different cellular compartments and their secretion, creation of physiological responses and their assessment by several kinds of instrumentation techniques which can create a common platform between science of engineering and biological science

### Course Content:

| <b>Units</b>                                                                                                                                                                                                                                                                               | <b>Lecture Hours</b> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| <b>Unit-I:</b> Cell biology & Communication: [ lecture] Structure, function, and synthesis of cellular membranes and organelles; cell growth and cancer; cytoskeleton and extracellular matrix; cell cycle; transport, receptors, and cell signaling; functions of specialized cell types. | <b>7</b>             |
| <b>Unit-II:</b> Genetics & Systems Biology [ lecture] Genetic switches and oscillators, cell-to-cell interactions, cellular and genetic networks, and evolutionary dynamics.                                                                                                               | <b>4</b>             |
| <b>Unit-III:</b> Transport & Flow in Biological Systems [ lecture] Diffusion, osmosis, facilitated, and active transport; Heat Conduction and Radiation; Fluid                                                                                                                             | <b>7</b>             |

| Units                                                                                                                                                                                                                                                                                                                                  | Lecture Hours |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Dynamics; Heat and Mass Transfer. Electromechanical and physicochemical interactions in cells and biomaterials.                                                                                                                                                                                                                        |               |
| <b>Unit-IV:</b> Human Physiology & Diseases [ lecture] Anatomical, physiological and pathological features of the cardiovascular, respiratory and renal systems. Identifications of deficiencies and diseases from blood, urine and feces; genetic disorders and gene therapy.                                                         | <b>10</b>     |
| <b>Unit-V:</b> Neurophysiology [ lecture] Neuron structure and function; Regeneration of nerve; flow and transport of signals from one neuron to other; Nervous system; Aging and its effect on brain; Behavioral functions of the brain - emotion, memory, learning and consciousness; Disorders of the nervous system and treatment. | <b>10</b>     |
| <b>Unit-VI:</b> Medical Biotechnology [ lecture] Understanding the handling and usefulness of electrocardiograms, ultrasound images, X-ray images, magnetic resonance images (MRI), computerized tomography (CT) or computerized axial tomography (CAT) images, glucose sensors, and other biosensors.                                 | <b>7</b>      |

#### Text Books:

- Biology for Engineers by Arthur T. Johnson. CRC Press, 1 edition, 2010.
- New Biology for Engineers and Computer Scientists by Aydin Tozeren and Stephen W. Byers. Pearson, 1 edition, 2003.

#### Reference Books:

- Applied Cell and Molecular Biology for Engineers by Gabi Nindl Waite and Lee R. Waite. McGraw-Hill Education, 1 edition, 2007.
- Samson Wright's Applied Physiology.
- Modes of Examination: Assignment/Quiz/Project/Presentation/Written

#### Examination Scheme:

| Components    | Class Assessment | Mid Term | End Term |
|---------------|------------------|----------|----------|
| Weightage (%) | 30               | 20       | 50       |

#### Relationship between Course Outcomes (COs) and Program Outcomes (POs):

| Course Code | Course Name   | COs  | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PS O1 | PS O2 | PS O3 |
|-------------|---------------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|
| BIT11003    | Life Sciences | CO 1 | -    | -    | -    | -    | -    | -    | -    | -    | 3    | -     | -     | 2     | 1     | 2     | -     |

| Course Code | Course Name | C O s | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PS O1 | PS O2 | PS O3 |
|-------------|-------------|-------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|
|             |             | CO 2  | -    | 2    | -    | -    | 3    | 2    | -    | -    | -    | -     | -     | -     | 3     | 3     | -     |
|             |             | CO 3  | -    | 2    | 1    | -    | 3    | -    | -    | 1    | -    | -     | -     | -     | 2     | 3     | -     |
|             |             | CO 4  | 1    | 2    | 3    | -    | 3    | 2    | -    | -    | -    | -     | -     | 2     | 3     | 3     | -     |
|             |             | CO 5  | 1    | 2    | 3    | -    | 3    | 2    | -    | -    | -    | -     | -     | 2     | 3     | 3     | -     |
|             |             | CO 6  | 2    | 2    | 1    | -    | 3    | 2    | -    | 1    | -    | -     | -     | 2     | 3     | 3     | -     |