



Sub Committee for Curriculum Development

Faculty of Health Sciences

Institute: Symbiosis School for Liberal Arts

Course Name: Biology (Major/Minor)

Introduction:

Symbiosis School for Liberal Arts offers Biology as a major or minor subject that can be taken up by students during their time here. The Biology major consists ten papers, and the Biology minor consists of the first six papers.

These are:

1. Introduction to Biology
2. Taxonomy, Diversity and Organization of Life
3. Ecology and Evolution
4. Biochemistry and Metabolism
5. Inheritance Biology
6. Cell and Molecular Biology
7. Reproductive and Developmental Biology
8. Applied Biology and Biotechnology
9. Mathematical Biology
10. Behavioural Biology (Cognitive Science, Sociobiology, and Evolutionary Psychology)

Name of Institute: Symbiosis School of Liberal Arts

Course Name: Biology Major/Minor Paper-1: Introduction to Biology

(UG/PG): UG

Number of Credits: 4

Level: 2

Course Description:

This is an introductory course that defines biology and its relationship to other sciences. It examines the overarching theories of life from biological research and also explores the fundamental concepts and principles of the study of living organisms and their interaction with the environment.

The course covers a broad range of introductory topics such as the importance of biology as a science, an introduction to the concepts related to the philosophy of biology, and explanations regarding the diversity of life alongside the various levels of organization in life. It also covers concepts such as the chemical basis of life, integral biological information, signalling in biology and also the component of laboratory work in biology.

Name of the Institute: Symbiosis School for Liberal Arts

Course Name: Biology Major/Minor Paper-2: Taxonomy, Diversity and Organization of Life

(UG/PG): UG

Number of Credits: 4 (60 hours)

Level: 2

Course Description:

This course introduces students to the hierarchical structure of biology and helps to give a broader perspective, before getting into the depths of the subject. Unlike a traditional approach to biology, students are not expected to memorize taxonomy. It aims to describe the properties associated with life. It teaches students to analyse characterization data, using classical as well as modern methods and to interpret phylogenetic and taxonomic information.

It covers a broad range of topics under this heading. These include teaching students about the diverse forms of life that exist in our world, the classical taxonomy of plants and animals, along with the levels of organisation in plants and animals. It seeks to establish a base of knowledge by teaching students the modern tools of taxonomy, and the importance of biodiversity and conservation, in today's context. It also involves related laboratory work.

Name of the Institute: Symbiosis School for Liberal Arts

Course Name: Biology Major/Minor Paper-3: Ecology and Evolution

(UG/PG): UG

Number of Credits: 4 (60 hours)

Level: 3

Course Description:

It is integral to learn evolution during the formative years of education in the field of biology, since evolution forms the logical framework on which all fields of biology have prospered. Keeping this in mind, the study of ecology must be undertaken simultaneously, since natural selection is largely driven by ecological challenges.

This course aims to study the ecology in a way that explicitly considers the evolutionary histories of species and the interactions between them.

This course studies topics such as the ecology of populations, the ecology of communities, behavioural ecology and the evolution of social behaviour. It also introduces students to applied ecology and environmental science, along with the life history and mechanisms of evolution, and evolutionary medicine.

Name of the Institute: Symbiosis School for Liberal Arts

Course Name: Biology Major/Minor Paper-4: Biochemistry and Metabolism

(UG/PG): UG

Number of Credits: 4

Level: 3

Course Description:

The aim of this course is to study the chemical processes within and relating to living organisms. It primarily focuses on understanding how biological molecules give rise to the processes that occur within living cells and how this, in turn relates greatly to the study and understanding of whole organisms.

The course seeks to make students understand the structures, functions, and interactions of biological macromolecules, such as proteins, nucleic acids, carbohydrates and lipids, which provide the structure of cells, and perform many of the functions associated with life.

It covers topics such as biological thermodynamics, proteins, energy generation, biosynthetic pathways, metabolic regulation, and the different methods in biochemistry. It also involves related lab work.

Name of the Institute: Symbiosis School for Liberal Arts

Course Name: Biology Major/Minor Paper-5 Inheritance Biology

(UG/PG): UG

Number of Credits: 4 (60 hrs)

Level: 3

Course Description:

The aim of this course is to teach students the biological mechanisms of inheritance, which is the passing of traits to the offspring from its parents or ancestor.

The course introduces to students the extra chromosomal inheritance, epigenetics, maternal effects, and cultural inheritance.

It gives students an in-depth understanding of various concepts such as classical genetics, molecular genetics, gene regulations, chromosomal organisation, somatic mutation, and cancer biology. It also teaches them the several other mechanisms of inheritance, and also the different methods in molecular genetics.

Name of the Institute: Symbiosis School for Liberal Arts

Course Name: Biology Major/Minor Paper-6 Cell and Molecular Biology

(UG/PG): UG

Number of Credits: 4 (60 hrs)

Level: 3

Course Description:

In this course, students will study Molecular Biology as an interdisciplinary field that bridges the fields of chemistry, structure, and biology, as it seeks to understand life and cellular processes at the molecular level.

This course is designed with the aim of making students understand the basic mechanisms that allow cells to have differentiated properties, and also the mechanisms that coordinate the activities that form the essential systems that define a living cell.

This course plays a crucial role in understanding the basis of human disease.

An array of major topics is covered under this course. These include the study of the comparative structure of prokaryotic and eukaryotic cells, and the study of cell cycle and cell division with regards to these cells. It also covers the study of the specialised cell functions of nerve cells and immune cells. It gives students an introduction to biophysics and structural biology along with the methods involved in cell biology.

Name of the Institute: Symbiosis School for Liberal Arts

Course Name: Biology Major Paper 7- Reproductive and Developmental Biology

(UG/PG): UG

Number of Credits: 4 (60 hrs)

Level: 3

Course Description:

The aim of this course is to help students gain a good understanding of normal processes, and regulatory mechanisms of reproduction & development. The primary focus is on the basic sciences, and their application to selected clinical aspects of the subject.

This course provides students with knowledge regarding the reproductive systems and the diversity of reproductive methods in microbes, plants and animals. It also provides a detailed study of the developmental biology of animals, ranging from the history of developmental biology to present-day stem cell biology and tissue repair. It also studies developmental biology in plants along with the methods in both reproductive and developmental biology.

Name of the Institute: Symbiosis School for Liberal Arts

Course Name: Biology Major Paper 8- Applied Biology and Biotechnology

(UG/PG): UG

Number of Credits: 4 (60 hrs)

Level: 4

Course Description:

The course is intended to give students an overview of the applications of biology across fields. It serves as a bridge between science and technology.

Its primary aim is to study the use of living systems and organisms to develop or make useful products, or any technological application that uses biological systems, living organisms or derivatives.

The major topics studied in this course include agriculture and plant biotechnology, along with concepts such as applied zoology, applied microbiology, vaccines and biologicals, nutrition, molecular biotechnology, and the methods involved in biotechnology.

Name of the Institute: Symbiosis School for Liberal Arts

Course Name: Biology Major Paper 9- Mathematical Biology

(UG/PG): UG

Number of Credits: 4 (60 hrs)

Level: 4

Course Description:

In this course, students are expected to study the mathematical representation, treatment, and modelling of biological processes, using a variety of applied mathematical techniques and tools. The aim is to understand complex, nonlinear mechanisms in biology, and to increase the computing power of students, thus enabling calculations and simulations to be performed with ease.

This course gives students an introduction to modelling in biology, and also teaches them about growth and population models, epidemiology and epidemiological needs, models in biochemistry, and modelling in neuroscience.

Name of the Institute: Symbiosis School for Liberal Arts

Course Name: Biology Major Paper 10- Behavioural Biology (Cognitive Science, Sociobiology and Evolutionary Psychology)

(UG/PG): UG

Number of Credits: 4 (60 hrs)

Level: 3

Course Description:

This course is designed with the aim of giving students an introduction to the study of the interaction between behaviour and biology, and the interconnected ways in which they influence each other.

It teaches students to observe how biology influences an individual's perception, and how reactions to life events can have substantial effects on hormonal and physiological functions.

The major concepts that students are taught in this course include classical and cognitive ethology, behavioural decision making and optimization, the biology of behaviour and evolutionary psychology.