Programme Outcomes

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Programme Specific Outcomes

Programme Names:

M.Sc. in Neuroscience

Ph.D. in Neuroscience

S. N. Pradhan Centre for Neurosciences
University of Calcutta
West Bengal, INDIA

The Master's program in Neuroscience was introduced in the year 2000. This is a first kind of program in any University or research institute in Eastern India. The major goal of the program is to impart quality teaching and training to the students on various aspects of Brain structure and functions and develop trained manpower having a broad overview of the different aspects of neuroscience. The passed out students would have acquired the basic knowledge in major disciplines of neuroscience, such as neuroanatomy, neuropathology, neurophysiology, neurochemistry, molecular neurobiology, neurogenetics, cognitive neuroscience and the knowledge of working of motor, sensory and regulatory systems. The development and regeneration of the brain as well as the knowledge in basics of clinical neuroscience in terms of diseases and diagnostic tools would also be provided. The department has been fully supported by DBT, Govt. of India since beginning. The department has received extra mural research grants from various Govt. funding agencies (DBT, DST, ICMR, DRDO, etc.) to work upon various pathological aspects of brain, including brain aging, neurodegenerative diseases, malnutrition and cognition, etc. These research and developmental grants have helped develop the departmental teaching and research facility to an advance level, comparable to any national level teaching department. The department is running programs in

- **Master of Science (M.Sc.)**

- **Doctor of Philosophy (Ph.D.)**

Programme Outcomes (POs)

The purpose of inducting **M.Sc. program in Neuroscience** at the University was to provide students Theoretical and Practical knowledge in various areas of basic and clinical neurosciences to help them build-up strong carrier in biology and biomedical science. The faculty members are putting all efforts to fulfil the requirement of students of this course.

The major objectives of the department are as follows:

1. To bring innovation and excellence in teaching and research in the area of neuroscience.

2. To organize community health services to screen and diagnose the various pathological conditions arising out of genetic, social or environmental issues, supporting the therapeutic strategies to be adopted at specialized hospitals/clinical centres.

3. To generate possible employment opportunities for the students.

4. To train the students in various tools and techniques applied in neuroscience to develop expertise in them for advance research in neuroscience and professionalism.

Programme Specific Outcomes (PSOs)

The course curriculum of Neuroscience has been designed to prepare the Master's students to attend the following program specific outcomes.

PSO1. The ability to understand and interpret the various cellular, biochemical, molecular and genetic principles related to the fundamental structure and functions of brain cells or neurons.

PSO2. To apply the skill developed during the studies in their future teaching and research activities and to increase their employability.

PSO3. Develop critical thinking power and innovative ideas of translational importance.

PSO4. To build-up confidence in venturing in to basic and advance research leading to academic achievements at national as well as international levels.

PSO5. To make the students competent enough to teach and train others later in their academic lives.

PSO6. To inculcate ethics and professionalism in the students to perform and extend services to the peoples and communities for their betterment.

Course Outcomes (COs)

I-M.Sc. Program

1st NS-P01-P05

CO1. To develop advance knowledge on cellular and molecular organization of living cells.

CO2. To understand the molecular properties of biomolecules, their synthesis and cellular functions.

CO3. To understand the anatomical structure of brain and various types of brain cells and their functions.

CO4. To understand the evolution and development of nervous system in various animal systems, including human, the molecular mechanisms involved in the process of neurogenesis during embryonic and adult stages and related pathologies.

CO5. To learn the detailed organization, properties and functions of human immune system in health and diseases.

CO6. To obtain practical training in cell biology, molecular biology, neuroanatomy, and neurodevelopmental techniques.

2nd NS-P06-P10

CO1. To understand the fundamental principles of Genetics and the pattern of inheritance of genetic traits.

CO2. To provide a comprehensive overview of exciting developments in neurogenetics research and molecular and cellular mechanisms that are disrupted in disorders that affect nervous system.

CO3. To understand the mechanism of nerve conduction, including electrical properties of excitable membranes or neurons, neural circuitry, synaptic transmission, etc.

CO4. To introduce the basics of neurochemistry and relate it to neurochemical bases of brain disorders and neuropathology.

CO5. To provide students with the theory and practical experience of the use of common computational tools and neuroscience databases.

CO6. To introduce the statistical methods for understanding the underlying principles, and practical guidelines of statistical analysis and data interpretation particularly for bio-systems.

3rd NS-P11-P15

CO1. To provide introductory knowledge concerning genomics, proteomics, metabolomics and their applications.

CO2. To understand the neurobiology of sensation with special reference to organization, properties and functions of various basic senses, including somatic sensation, olfaction, vision, audition, etc. Basic overview on both sensory and motor systems will be obtained.

CO3. To learn about central regulation of major systems and autonomic functions, including central control of breathing, cardiovascular activities, circadian timings, sleep, psychosexual developments, etc.

CO4. To get the basic understanding of evolution of human brain and behaviour, cellular and genetic aspects of behaviour, cognitive development, neural control of attention, language acquisition and language processing, learning and memory, etc.

CO5. To provide theoretical and practical exposure to various methods involved in studying neuropathology and behaviour and brain functions.

CO6. Trained to work independently on any experimental problem relevant to the subject.

4th NS-P16-P20

CO1. To learn biosafety and risk assessment of products derived from biotechnology and regulation of such products, to become familiar with ethical issues in biological research, and to become familiar with India's PR Policy;

CO2. To learn working principles and applications of various tools and techniques applied in neuroscience research.

CO3. To sensitize students about recent advances in molecular biology and various facets of molecular medicine which has potential to profoundly alter many aspects of modern medicine including pre- or post-natal analysis of genetic diseases.

CO4. To learn the structures and functions of various ion channels, including neurotransmitters, receptor proteins, etc., involved in the neurochemical regulation of brain function.

CO5. To prepare the students to adapt to the research environment and understand how projects are executed in a research laboratory.

CO6. To enable the students to learn practical aspects of research and train students in the art of analysis and thesis writing.

II-Ph.D. Programmes

Neural Regeneration & Neurodegenerative Disease Biology Laboratory

Programme Outcomes

- In-depth analysis of modern aspects of neurodegenerative disease biology by high throughput genetic analysis and its translational impact on prognosis & diagnosis.
- Inculcate critical thinking to carry out scientific research on various aspects of neural repair and regeneration which plays a central role in regenerative therapies.
- To ascertain whether genetic and epigenetic modifications can be used as a target for treating specific medical conditions of neurological diseases and disorders.
- Latest usage of computer programmes and artificial intelligence dedicated to nucleotide sequence analysis and medical image based disease detection.

Ph.D. Course Work Outcomes

SEMESTER I		
Course 1	Review of Published Research (Research methodology)	**Knowledge gained** - Intensive knowledge in particular field and tools and techniques. - For Example, "Assessment and effect of genotoxic substanceson animal and human health". - Genetic and molecular basis of genotoxicity. **Skill gained** - Equipped to compile scientific resources published in journals motivated for Researches or Higher studies. **Competence Developed** - Competent to design and develop research ideas in advanced areas of neuroscience. - Equipped to pursue researches for doctoral and postdoctoral studies in reputed academic institution/ industries.

Course 2	Research Ethics	**Knowledge gained** • Plagiarism, sampling and collection. • Ethics for animal handling. • IPR, Breeders right, Ethics and regulation of germ plasmexchange, Genome Edited animals, Transgenic animals. **Skill gained** • Motivated for maintaining high ethics in science. • Patenting, environmental concerns and safety related totransgenic animals. **Competence Developed** • Competent to sampling and data collection from field. • Ethical issues of animal breeding and handling.
Course 4	Advance course in Neuroscience	**Knowledge gained** • Principles and applications of different instruments andprocedures. • Chromatography. • Electrophoresis. • Microscopy. • Immunological techniques. • PCR based molecular techniques. • Taxonomy, Biodiversity. **Skill gained** • Equipped to use and handle various tools and techniquestaught. **Competence Developed** • Competent to utilize various tools and techniques duringresearch according to need.