

Department of Physics, Tezpur University

Program objectives and Programme Outcomes of Different Programmes in the Department of Physics, Tezpur University

[1]. M. Sc. In Physics:

Duration: 2 years (04 semesters)

A. Programme Objectives:

The Department of Physics is committed to impart quality education both in theoretical as well as experimental physics with special emphasis on 'learning by doing' to produce quality manpower for teaching and research. The objectives of the M.Sc. Physics programme are:

1. to impart quality education in physics to students through well designed courses of fundamental interest and of technological importance.
2. to enable the students to acquire deep knowledge in fundamental aspects of all branches of Physics.
3. to assist the students in acquiring basic knowledge in the specialized thrust areas such as Condensed Matter Physics and Nanoscience, Photonics, Electronics, High Energy Physics, Plasma Physics and Astrophysics,
4. to develop abilities and skills that encourage research and development activities and are useful in everyday life
5. to inculcate scientific bent of mind and attitude relevant to science such as concern for efficiency, accuracy and precision, objectivity, integrity, enquiry, effective communication, ethical responsibilities, Initiative and Inventiveness.

B. Programme Outcomes:

Upon completion of the M.Sc. Physics programme students should:

- (i) have acquired substantial knowledge of different areas in physics, basic knowledge in mathematics with advanced knowledge in some specialized areas of physics.
- (ii) be able to apply theoretical and/or experimental methods, including the use of numerical methods and simulations.
- (iii) have some research experience within a specific field of physics, through a supervised project (Master's dissertation).
- (iv) be familiar with contemporary research within various fields of physics and have the background and experience required to model, analyse, and solve advanced problems in physics.

[2]. Integrated M. Sc. In Physics:

Duration: 5 years (10 semesters)

Exit option with a B. Sc. degree at the end of third year

A. Programme Objectives:

The main objective of the Integrated M. Sc. (Physics) Programme is to prepare the younger generation to cope with the emerging scenario in the top level academic and research institutions, and also industries of national importance. The programme aims to train the students with a high level theoretical knowledge enabling them to tackle

complex problems in industrial fields as well as to pursue further academic achievements through research. Since Physics, Mathematics, Chemistry and Life Sciences are fundamental courses in sciences, students are taught a mix of all these four subjects during the first two years. After successful completion of fundamental courses, a student takes up core courses in physics. In addition to the core physics subjects, the students can acquire additional expertise in special areas of physics in the final year. During this period, all possible opportunities are created for close interaction with research institutes and industries so as to provide high level training.

B. Programme Outcomes:

At the end of the Integrated M.Sc. (Physics) programme students should:

- (i) have general competence in different branches of Science such as Physics, Chemistry, Mathematics, Life Sciences with emphasis on the evolution of physics, its possibilities and limitations,
- (ii) attain the systemic knowledge with technical proficiency in the field of Physics both theoretically as well as experimentally.
- (iii) be able to apply fundamental principles of physics together with analytic tools to evaluate and describe complex physical situations.
- (iv) have acquired substantial knowledge of different areas in physics, basic knowledge in mathematics with advanced knowledge in some specialized areas of physics.
- (v) have some research experience within a specific field of physics, through a supervised project (Master's dissertation).
- (vi) be familiar with contemporary research within various fields of physics and have the background and experience required to model, analyse, and solve advanced problems in physics.
- (vii) enhance their skills for continuous professional development in response to technological and social challenges.
- (viii) be able to apply scientific and technical knowledge and skills to other disciplines and areas of study.

[3]. BSc. B.Ed. (Integrated) Programme:

Duration: 04 years (8 Semesters)

A. Programme Objectives:

B.Sc. B.Ed. programme is designed to cater to the needs of Senior Primary and Secondary Schools where the subjects are general in nature and students have to learn basic and fundamental concepts in the fields of Physics, Maths, Science, Languages and Social Sciences. The core element of the course is based on primary concerns of teacher education and subjects within. The objectives of the programme are:

1. to enable the students to acquire and use the competencies and skills needed for becoming a competent, committed and effective Physics teacher through innovative teaching methods.
2. to inculcate rational thinking and scientific temper among the students.

3. to develop the understanding and competencies required by practising teachers for effective teaching-learning process at the secondary stage and
4. to develop critical awareness about the social realities and to be sensitive about the psychological and sociological aspects of the child's development.

B. Programme Outcomes:

At the completion of B. Sc. B.Ed. in Physics (Major), a student should have:

- (i) acquired the knowledge with facts and figures related to various subjects in pure sciences such as Physics, Chemistry, Mathematics, Biosciences, etc.
- (ii) learnt the art of teaching and acquired the ability to deal with the students based on their individual differences in various classroom situations.
- (iii) understood the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena.
- (iv) acquired the skills in handling scientific instruments, planning and performing in laboratory experiments.
- (v) attained the skills of observations and drawing logical inferences from the scientific experiments.
- (vi) been able to think creatively in explaining facts and figures or providing solutions to the problems.
- (vii) realized how interdisciplinary approach helps in providing better solutions and ideas for the sustainable development.
- (viii) developed various communication skills such as reading, listening and speaking, which help in expressing ideas and views clearly and effectively.

[4]. Ph.D. Programme:

Duration: 04 years (06 years in case of part-time students)

State of art Research labs

Since its inception in 1998, the Department has strived to create an environment and enhance its resources for teaching and research in forefront areas. The department provides a conducive and rigorous research environment. The PhD programme is designed to produce graduates with rigorous research and subject-specific advanced analytical skills and training to excel in a variety of institutional settings, including universities, industry and government research labs. The research interests of the faculty fall in various areas of condensed matter physics, photonics, high energy physics, microwaves, plasma physics, astrophysics, neutrino physics and nanoscience and technology. The Department is also working in association with other institutes like IUCAA Pune, CMMACs Bangalore, IIT Guwahati, CAT Indore, VECC Kolkata, SAMEER Mumbai, IUAC New Delhi, University of Southampton UK, Queen's University Belfast, University of Tokyo Japan, Max Planck Institute Germany and others. The Department of Physics is a UGC-SAP, DST-FIST and ISRO supported Department.

A. Programme Objectives:

The Ph.D. Programme provides:

1. sustained in-depth study on a specific topic to enable the student to critically examine the background literature relevant to their specific research area.

2. an environment that encourages the student's originality and creativity in their research and an opportunity to develop skills in making and testing hypotheses, in developing new theories, and in planning and conducting experiments; developing practical research skills and learn new state of the art techniques.
3. the opportunity to expand the student's knowledge of their research area, including its theoretical foundations and the specific techniques used to study it.
4. an environment in which to develop skills in written work, oral presentation and publishing the results of their research in high-profile scientific journals.

B. Programme Outcomes:

After the completion of their PhD programme, students should:

- (i) have a thorough knowledge of literature and a comprehensive understanding of scientific methods and techniques applicable in their field of research.
- (ii) be able to summarize major themes and current research problems in their area of specialization and be able to explain and identify open problems and areas needing development in their fields.
- (iii) be able to demonstrate originality in the application of knowledge, together with a practical understanding of how research and enquiry are used to create and interpret knowledge in their field.
- (iv) have originality in tackling and solving problems and developed the ability to critically evaluate research techniques and methodologies.
- (v) be able to act independently in the planning and implementation of research and have carried out and presented an original work of research in their discipline.