Department of Physics

Ph.D. Degree Program

The Department of Physics in the School of Natural Sciences at SNU is an active and growing research center with focus in the fields of experimental and theoretical condensed matter physics, experimental and theoretical particle physics, surface science, nanotechnology and development of novel materials for energy and environmental applications. The department offers a vibrant and rigorous graduate program drawing on its many strengths:

• It is a part of the SoNS which encourages and facilitates interdisciplinary research activities.

• Many of the faculty members have worked in some of the leading international research institutes. Some of them are part of large international research collaborations.

• The department encourages collaborative research with industry and some of the faculty members are exploring joint research program with leading technological companies.

Eligibility: Candidate should have a master degree in science or engineering with a minimum of 60% marks (first class) or an equivalent grade point. For a candidate having a 4-year BS/ BTech or an MTech degree in engineering, the norm may be relaxed if s/he can demonstrate sufficient mastery of the fundamentals through written tests, interview, etc. These criteria may be relaxed further for candidates having a valid score in any one of the following National Examinations: CSIR-UGC, NET, JEST, and GATE.

Physics department enrolls Ph.D. scholars twice every year, at the beginning of the Monsoon (starting in August) and Spring (starting in January) semesters. For details, please visit the university website: www.snu.edu.in.

Research Advisor: Every new graduate student will be assigned a research advisor. This will be a faculty member whose research interests overlaps with that of the student. The advisor will help in initiating the student's research program.

Faculty:

- Dr. Sankar Dhar, Professor & Head of the Department <sankar.dhar@snu.edu.in>
- Dr. Bijan Bagchi, Professor & UGC Emeritus Fellow <bijan.bagchi@snu.edu.in>
- Dr. Susanta Sinha Roy, Professor <susanta.roy@snu.edu.in>
- Dr. Aloke Kanjilal, Professor <aloke.kanjilal@snu.edu.in>
- Dr. Samarendra P. Singh, Associate Professor <samarendra.singh@snu.edu.in>
- Dr. Priya Johari, Associate Professor <priya.johari@snu.edu.in>
- Dr. Santosh Kumar, Associate Professor <santosh.kumar@snu.edu.in>
- Dr. Sajal Ghosh, Associate Professor <sajal.ghosh@snu.edu.in>
- Dr. Syed Mohammad Kamil, Assistant Professor <kamil.syed@snu.edu.in>
- Dr. Bhaskar Kaviraj, Assistant Professor <bhaskar.kaviraj@snu.edu.in>
- Dr. Subhra Sen Gupta, Assistant Professor <subhra.sengupta@snu.edu.in>
- Dr. Kenji Nishiwaki, Assistant Professor <kenji.nishiwaki@snu.edu.in>
- Dr. Arindam Chatterjee, Assistant Professor <arindam.chatterjee@snu.edu.in>
- Dr. Mayukh Majumder, Assistant Professor <mayukh.majumder@snu.edu.in>

The research interests of the faculty are summarized at https://physics.snu.edu.in/people/faculty

Coursework: The aim of the coursework is to ensure that a graduate scholar has the required foundation for starting his/her research work. The coursework comprises of core, elective and research exploratory courses. Each scholar is expected to take a minimum of 12 credits per semester and teaching/research assistantship throughout the graduate program. A scholar is expected to complete five core and three elective courses according to his/her research interest during the first two semesters. The Physics Graduate Advisor will assist all the Ph.D. scholars in this process.

<table>
<tr><th colspan="6">The Foundation</th></tr>
<tr><td rowspan="2">Semester 1</td><td>PHY 506
Classical Mechanics
Credit 1.5 (1.5:0:0)</td><td>PHY 507
Statistical Mechanics
Credit 1.5 (1.5:0:0)</td><td rowspan="2">PHY 550
Condensed Matter Physics
Credit 3 (3:0:0)
OR
PHY 560
High Energy Physics
Credit 3 (3:0:0)</td><td rowspan="2" colspan="2">PHY 599
Explorations in Research
Credit 3 (3:0:0)</td></tr>
<tr><td>PHY 508
Quantum Mechanics
Credit 1.5 (1.5:0:0)</td><td>PHY 509
Classical Electrodynamics
Credit 1.5 (1.5:0:0)</td></tr>
<tr><td>Semester 2</td><td>PHY 5XX*
Physics Elective
Credit 3 (3:0:0)</td><td colspan="4">DTD 899: Ph.D. Thesis (9 credits)</td></tr>
<tr><th colspan="6">Research</th></tr>
<tr><td>Semester 3</td><td colspan="2">DTD 899: Ph.D. Thesis (12 credits)</td><td colspan="3">Comprehensive Examination</td></tr>
<tr><td>Semester 4</td><td colspan="2">Advancement to Candidacy</td><td colspan="3">DTD 899: Ph.D. Thesis (12 credits)</td></tr>
<tr><td>Semester 5</td><td colspan="5">DTD 899: Ph.D. Thesis (12 credits)</td></tr>
<tr><td>Semester 6</td><td colspan="2">DTD 899: Ph.D. Thesis
(12 credits)</td><td rowspan="2">Synopsis submission</td><td rowspan="2" colspan="2">Thesis submission</td></tr>
<tr><td>Semester 7</td><td colspan="2">DTD 899: Ph.D. Thesis
(12 credits)</td></tr>
</table>

Semester 8	DTD 899: Ph.D. Thesis (12 credits)	*(any time after 5th semester but within 10th semester)*	*(any time after 5th semester but within 10th semester)*
Semester 9	DTD 899: Ph.D. Thesis (12 credits)		
Semester 10	DTD 899: Ph.D. Thesis (12 credits)		
Doctoral Thesis Defense			
Minimum Credit Requirements: Course Work- 15 & Ph.D. Thesis - 45			

*may take non-departmental elective courses with the approval of both graduate student advisor and research advisor.

Graduate Core Courses

PHY 506: Classical Mechanics – 1.5 Credits: 3 Lectures/week
PHY 507: Statistical Mechanics – 1.5 Credits: 3 Lectures/week
PHY 508: Quantum Mechanics – 1.5 Credits: 3 Lectures/week
PHY 509: Classical Electrodynamics -- 1.5 Credits: 3 Lectures/week
PHY 599: Explorations in Research -- 3 Credits
PTC 899: Practicum in Teaching
DTD 899: Ph.D. Thesis

More Graduate Courses

PHY 547: Advanced mathematical Methods in Physics -- 3 Credits: 3 Lectures/week
PHY 550: Condensed Matter Physics -- 3 Credits: 3 Lectures/week
PHY 551: Nanomaterials and Nanophysics -- 3 Credits: 3 Lectures/week
PHY 553: Soft Matter Physics-- 3 Credits: 3 Lectures/week
PHY 554: Advanced Statistical Physics -- 3 Credits: 3 Lectures/week
PHY 556: Introduction to Quantum Field Theory -- 3 Credits: 3 Lectures/week
PHY 557: Probability, Statistics, Matrix Theory and Applications -- 3 Credits: 3 Lectures/week
PHY 558: Semiconductor Physics and Devices -- 3 Credits: 3 Lectures/week
PHY 560: High Energy Physics -- 3 Credits: 3 Lectures/week
PHY 562: Experimental Techniques in Particle Physics -- 3 Credits: 3 Lectures/week
PHY 563: Computational and Numerical Analysis -- 3 Credits: 2 Lectures+1 hour lab/week
PHY 564: Advanced Simulation Techniques -- 3 Credits: 3 Lectures/week
PHY 566: Introduction to String Theory -- 3 Credits: 3 Lectures/week
PHY 568: Multiferroics and Shape Memory Alloys -- 3 Credits: 2 Lectures+2 hours lab./week
PHY 570: Biosensors: General Principles and Advanced Sensing Techniques -- 3 Credits: 3 Lectures/week
PHY 573: Characterization of Materials -- 3 Credits: 2 Lectures/week + 2 hours lab/week
PHY 574: Characterization of Materials-I -- 3 Credits: 3 Lectures/week
PHY 575: Characterization of Materials-II -- 3 Credits: 3 Lectures/week
PHY 576**:** Electronic Transport in Mesoscopic Systems -- 3 Credits: 3 Lectures/week
PHY 578: Introduction to Thin Films -- 3 Credits: 3 Lectures/week
PHY 588: Fundamentals of Ion-Solid Interactions -- 3 Credits: 3 Lectures/week
PHY 589: Ion Beam Based Materials Characterization Techniques -- 3 Credits: 3 Lectures/week

Graduate Student Advisor of the Department of Physics: Dr. Susanta Sinha Roy <susanta.roy@snu.edu.in>
