

**ANNEXURE - I**  
**INTEGRATED Ph.D. PROGRAMME**  
**IN PHYSICAL SCIENCES**

**COURSE STRUCTURE**

L=Lectures T=Tutorials P=Practicals in hours per week & C=Credit points

**First Semester**

Course No.	Course Title	L	T	P	C
PHY101	Classical Dynamics	3	1	0	4
PHY102	Mathematical Methods I	3	1	0	4
PHY103	Quantum Mechanics I	3	1	0	4
PHY104	Electromagnetic Theory I	3	1	0	4
PHY191	Basic Laboratory I *	0	2	6	6
PHY105	Computational Methods in Physics I	2	0	2	4

**Second Semester**

Course No.	Course Title	L	T	P	C
PHY201	Statistical Mechanics	3	1	0	4
PHY202	Mathematical Methods II	3	1	0	4
PHY203	Quantum Mechanics II	3	1	0	4
PHY204	Electromagnetic Theory II	3	1	0	4
PHY291	Basic Laboratory II *	0	2	6	6
PHY205	Computational Methods in Physics II	2	0	2	4

\*For these laboratory based courses tutorials involve discussions on the underlying theory and methodology of the experiments. Each such course would occupy eight lab-hours distributed over two days in each week.

In the Summer following the Second Semester students will start taking up projects to enable him or her to develop an integrated research attitude towards physics.

Course No.	Course Title	L	T	P	C
PHY292	Project-based Course I**	-	-	8	6

\*\*In the case of Project-based Courses "P" indicates the number of interaction hours per week.

### Third Semester

Course No.	Course Title	L	T	P	C
PHY391	Methods of Experimental Physics*	3	1	3	7
PHY301	Quantum Mechanics III	3	1	0	4
PHY302	Condensed Matter Physics	3	1	0	4
PHY303	Nuclear & Particle Physics	3	1	0	4
PHY304	Project-based Course II**	-	-	8	6

\* “Advanced Laboratory” involving routine experiments [such as NMR, Mossbauer, X-Ray Diffraction, Electron Microscopy, Accelerators etc in the research laboratories of the participating institutions], shall be integrated into this course.

### Fourth Semester

Course No.	Course Title	L	T	P	C
PHY401	Project-based Course III**	-	-	8	6
PHY402	Seminar Course***	-	-	-	2
PHY###	Elective I	3	1	0	4
PHY###	Elective II	3	1	0	4
PHY###	Elective III	3	1	0	4

\*\*In the case of Project-based Courses ”P” indicates the number of interaction hours per week.

\*\*\*The Seminar course is meant to reinforce good scientific communication skills among the students. The course involves each student making a seminar presentation on a topic that he/she has read up during the semester.

Course numbers of the Electives will be assigned from year to year in accordance with the courses offered.

**Possible Electives which may be offered in the Fourth Semester could be for example:**

- Advanced Statistical Physics
- Astrophysics
- Physics of Nano-materials
- Advanced Mathematical Methods
- Advanced Quantum Field Theory
- General Relativity and Cosmology
- The Standard Model of Elementary Particles
- Low and Intermediate Energy Nuclear Physics
- Accelerator Based Physics
- Quantum Theory of Many Body Systems

- Optical Physics
  - Chemical Physics
  - Physics of Materials
  - Magnetism and Superconductivity
  - Soft Condensed Matter Physics
  - Plasma Physics
  - Quantum Information Theory
  - Micro-electronics & VLSI Design
  - Bio-inspired Physics
- etc. etc.

The actual courses offered will vary from year to year depending on the choice of specialization made by the students in consultation with the Counselling Committee, availability of teachers, and topicality of the subject etc.