

# DEPARTMENT OF PHYSICS & ASTROPHYSICS

University of Delhi-110007

## Guidelines for allotment of elective papers for semesters III and IV

- Every student needs to opt for 5 courses in semester-III and 5 courses in semester-IV during the academic year 2020-21.
- Each student needs to fill one “Student Information Form” and their subject options in a “Google Form” which will be sent to his/her registered email id.
- Please note that the form can be filled **only once**, changes at a later stage will not be allowed.
- Each student must earn at least 4-credits from open elective course(s) during the M. Sc. Programme. Each student can take maximum upto 2 open electives, one in the III semester and other in the IV semester. She/he is allowed to choose only one open elective course offered by the Department of Physics & Astrophysics. Other open electives will be offered by the other Departments of the Faculty of Science.
- Students can opt for either “Experimental stream” or “Theory stream”.
- All experimental stream modules are two semester modules, with two courses in each module and it is mandatory to take both of these. Part-I will be taught in semester-III and part-II will be taught in semester-IV.
- **Dissertation:** For the academic year 2020-2021, students can opt for **Dissertation in (III + IV) Semesters (with evaluation in each semester) or only IV semester.** (Eligibility: minimum 60% in semester-I and a consent letter from supervisor.)

## Restrictions on choice of elective papers:

### **Restrictions in Semester –III:**

1. The theory and corresponding lab. course in an Experimental Module will be allotted together as one unit.
2. A student is allowed only one course from each of the following pairs of courses:
  - i) *Particle Physics-I (PH-ET535)* or *Plasma Physics-I (PH-ET534)*
  - ii) *Condensed Matter Physics-I (PH –ET 533)* or *Astrophysics-I (PH-ET532)*
  - iii) *Advanced Solid State Physics-I (PH-ET519)* or *Condensed Matter Physics-I (PH-ET533)*
  - iv) *Introductory Astronomy (PH-OT542)* or *Astrophysics-I (PH-ET532)*

### **Restrictions in Semester – IV:**

1. For a student opting for the experimental stream, it is mandatory to take part-II of the chosen experimental module.
2. For a student opting for the theoretical stream,

Part-I of a course is mandatory for opting part-II of that course.

A student may opt for other electives in lieu of part-II of a theory course.
3. A student is allowed only one course from each of the following set of courses:

*(PH-ET581) or (PH-ET582) or (PH-ET583) or (PH-ET584) or (PH-ET585) (check group B-IV below)*  
*(PH-ET586) or (PH-ET588) (check group B-IV below)*
4. Observational Astronomy Lab. course (PH-EL564) will only be allotted to students having Astrophysics-I (PH-ET532) in the semester-III.
5. Advanced Numerical Techniques can be taken only as a module comprising of two courses, a theory course (PH-ET561) and a lab. component (PH-EL562).

## Methodology to be adopted for course allotments:

- A merit list will be prepared based on the total SGPA secured in semester-I. Initially, the number of ERs will not be taken into account while preparing the merit list. However, if there is a tie between two or more students than the number of ERs and subsequently total credit points will be considered.
- For semester-III, the first two elective papers will be allotted to all students as per their preference according to merit.
- After allocating the first two elective papers to all the students, the third option will be allocated according to their preferences and merit.
- For semester -IV, the part-II of the experimental module and dissertation would be allotted automatically.
- The remaining optional papers will be allotted based on the student's choice and merit.

### Semester III

Course	Pre-requisite(s) & co-requisite
<b>PH-ET535:</b> Particle Physics I	<b>Co-requisite :</b> <b>PH-ET536:</b> Quantum Field Theory I
<b>PH-OT543:</b> Complex Systems & Networks	<b>Pre-requisite:</b> Mathematics in classes XI and XII

### Semester IV

Course	Pre-requisite & co-requisites
<b>PH-ET575:</b> Particle Physics II	<b>Pre-requisites:</b> <b>PH-ET535:</b> Particle Physics I, <b>PH-ET536:</b> Quantum Field Theory I <b>Co-requisite:</b> <b>PH-ET576:</b> Quantum Field Theory II
<b>PH-OT591:</b> Biological Physics	<b>Pre-requisite:</b> Mathematics in classes XI and XII
<b>PH-OT592:</b> Physics Education	<b>Pre-requisite:</b> Physics as one of subjects in B.Sc.

## SEMESTER-III (5 courses)

### Compulsory Courses

1. **Nuclear and Particle Physics:** PH-CT501
2. **Computational Physics:** PH-CL502

### Optional Courses: Three courses to be selected

Experimental Stream		Theoretical Stream
<ol style="list-style-type: none"><li>1. Five sets available to choose from, options are listed below under "Group A-III". Each set has one theory course and one lab course.</li><li>2. Choose one additional course from the following  "Group B-III" (theory courses) "Group C-III" (open elective) "Dissertation-I"</li></ol>	<b>OR</b>	<p>Choose any three from the courses listed under the following:</p> <p>"Group B-III" (theory courses) "Group C-III" (open elective) "Dissertation-I"</p>

#### Dissertation-I (PH-ED540):

**For the academic year 2020-2021, students can opt for Dissertation in (III + IV) semesters (with evaluation in each semester) or only IV semester. Eligibility: minimum 60% in semester-I and a consent letter from supervisor.**

### Group A-III: Experimental modules (Lab-theory papers + Expt. (Lab.) papers)

- 1) Physics at Nano Scale-I: Theory + Expt. (PH-ET511 & PH-EL512) **Seats- 40**
- 2) Advanced Electronics-I: Theory + Expt. (PH -ET513 & PH-EL514) **Seats- 60**
- 3) Nuclear Physics-I: Theory + Expt. (PHYS -ET515 & PH-EL516) **Seats- 40**
- 4) Laser & Spectroscopy -I: Theory + Expt. (PHYS -ET517 & PH-EL518) **Seats- 40**
- 5) Advanced Solid State Physics -I: Theory + Expt. (PHYS -ET519 & PH-EL520) **Seats- 40**

### Group B-III: Theoretical courses

1. GTR & Cosmology-I (PH-ET531) **Seats- 60**
2. Astrophysics -I (PH-ET532) **Seats- 60**
3. Condensed Matter Physics -I (PH-ET533) **Seats- 60**
4. Plasma -I (PH-ET534) **Seats- 60**
5. Particle Physics – I (PH-ET535) **Seats- 60**
6. Quantum Field theory -I (PH-ET536) **Seats- 60**
7. Advanced Mathematical Physics (PH-ET537) **Seats-60**

### Group C-III: Open Electives

1. Radiation Safety (PH-OT541) **Seats- 60 + 60 (for students of other Departments)**
2. Introductory Astronomy (PH-OT542) **Seats- 60 + 60 (for students of other Departments)**
3. Complex Systems & Networks (PH-OT543) **Seats- 60 + 60 (for students of other Departments)**

## SEMESTER-IV (5 courses)

### Compulsory Course

#### I. Atomic and Molecular Physics: PH-CT503

### Optional Courses: Four courses to be selected

Experimental Stream		Theoretical Stream
<p>1. "Part-II" of the courses taken in Sem-III, courses are listed under "Group A-IV" (one theory course and one lab course)</p> <p>3. Choose two additional courses from the following</p> <p>"Group B-IV" (theory courses + lab courses) "Group C-IV" (open elective) "Dissertation-II"</p>	<b>OR</b>	<p>Choose any four from the courses listed under the following:</p> <p>"Group B-IV" (theory courses + lab courses) "Group C-IV" (open elective) "Dissertation-II"</p>

#### Dissertation-II (PH-ED580):

For the academic year 2020-2021, students can opt for Dissertation for the (III + IV) Semesters (with evaluation in each semester) or only IV semester. Eligibility: minimum 60% in semester-I and a consent letter from supervisor.

#### **Group A-IV: Experimental module (Lab-theory papers + Expt. (Lab.) papers).**

- |   |                  |
|---|------------------|
| 1) Physics at Nano Scale -II: Theory + Expt. (PH-ET551 & PH-EL552)        | <b>Seats- 40</b> |
| 2) Advanced Electronics -II: Theory + Expt. (PH -ET553 & PH-EL554)        | <b>Seats- 60</b> |
| 3) Nuclear Physics -II: Theory + Expt. (PH-ET555 & PH-EL556)              | <b>Seats- 40</b> |
| 4) Laser & Spectroscopy -II: Theory + Expt. (PH-ET557 & PH-EL558)         | <b>Seats- 40</b> |
| 5) Advanced Solid State Physics -II: Theory + Expt. (PH-ET559 & PH-EL560) | <b>Seats- 40</b> |

#### **Group B-IV: Theoretical papers and Lab. papers**

- |   |                  |
|---|------------------|
| 1. Quantum Field theory –II (PH-ET576)                              | <b>Seats- 60</b> |
| 2. GTR & Cosmology-II (PH-ET571)                                    | <b>Seats- 60</b> |
| 3. Astrophysics –II (PH-ET572)                                      | <b>Seats- 60</b> |
| 4. Condensed matter Physics –II (PH-ET573)                          | <b>Seats- 60</b> |
| 5. Plasma Physics –II (PH-ET574)                                    | <b>Seats- 60</b> |
| 6. Particle Physics – II (PH-575)                                   | <b>Seats- 60</b> |
| 7. Non-linear Dynamics (PH-ET581)                                   | <b>Seats- 60</b> |
| 8. String Theory (PH-ET582)   | <b>Seats- 60</b> |
| 9. Superconductivity, Superfluidity & Critical Phenomena (PH-ET583) | <b>Seats- 60</b> |
| 10. Soft Matter Physics (PH-ET584)                                  | <b>Seats- 60</b> |
| 11. Fluid dynamics (PH-ET585)                                       | <b>Seats- 60</b> |



12. Nuclear Astrophysics (PH-ET586) **Seats- 60**
13. Applied Physics (PH-ET588) **Seats- 60**
14. Advanced Numerical Techniques Module: (Theory + Computer Lab.) (PH-ET561 + PH-EL562): **Seats- 50**
15. Observational Astronomy Lab. (Lab. Course) (PH-EL564) **Seats- 18**

#### **Group C-IV: Open Electives**

1. Biological Physics (PH-OT591) **Seats- 60 + 60 (for students of other Departments)**
2. Physics Education (PH-OT592) **Seats- 60 + 60 (for students of other Departments)**

**Note: A minimum of 10 students are required for an elective course to run.**