

# MANGALORE UNIVERSITY

DEPARTMENT OF POST GRADUATE STUDIES &  
RESEARCH IN PHYSICS  
MANGALORE UNIVERSITY  
MANGALAGANGOTTHRI 574199

**SYLLABUS FOR CHOICE BASED CREDIT  
SYSTEM FOR THE TWO YEAR (FOUR  
SEMESTER) POST GRADUATE DEGREE  
PROGRAMME IN M.Sc. (PHYSICS)**

FOR THE DEGREE  
OF  
**MASTER OF SCIENCE  
IN PHYSICS**

DEPARTMENT OF PHYSICS  
MANGALAGANGOTTHRI

**MANGALORE UNIVERSITY  
DEPARTMENT OF PHYSICS**

**REGULATIONS AND SCHEME OF EXAMINATIONS FOR TWO – YEAR (FOUR SEMESTERS) MASTER’S DEGREE COURSE IN PHYSICS FOR CHOICE BASED CREDIT SYSTEM**

**Title of the Programme**

The programme shall be called Master of Science in Physics – M Sc (Physics)

**Programme Learning Outcome (PLO)**

- PLO1. **Physics knowledge:** The MSc physics programme create a comprehensive scientific knowledge, and this knowledge will help to understand, explain, and to solve advanced scientific problems.
- PLO2. **Problem analysis:** Identify, formulated and analyse advanced problems in physics.
- PLO3. **Design/development of solutions:** Design solutions for complex problems using the knowledge of physics.
- PLO4. **Conduct investigations of complex problems:** Use methodology and knowledge of physics to design innovative experiments, analyse and interpret the data.
- PLO5. **Modern tool usage:** To apply modern experimental and theoretical tools of physics along with modern computation technology to predict and model advanced problems in physics.
- PLO6. **Physics and society:** Apply the knowledge of physics to critically assess and analyse the problems of society.
- PLO7. **Environment and sustainability:** To ensure that the development in physics maintains and sustains the environment.
- PLO8. **Ethics:** Apply and commit to professional ethics of physics.
- PLO9. **Communication:** Effectively communicate the activities of physics to physics community and to society through effective presentation, reports and documentation.
- PLO10. **Project management:** To demonstrate the knowledge of physics and to apply it to multidisciplinary environments.
- PLO11. **Life-long learning:** Recognize the need to engage in independent and life-long learning in the context of scientific/ technological change.

**Programme Specific outcome (PSO)**

**PSO1**

On completion of the course the students will be able to explain the wide range of physical phenomena with underlying principles with respect to condensed matter physics, nuclear and particle physics both scientifically and in the wider perspective to the community.

**PSO2**

The current status of physics and associated developments can be understood and explained thoroughly.

**PSO3**

Show the ability to solve physics related problems and demonstrate the physics phenomenon through experiments.

**PSO4**

Well qualified to clear national level and state level qualifying examinations for research and teaching at graduate and postgraduate levels.

**PSO5**

The knowledge acquired during the course would also make the students able to pursue their higher studies as well as to use their knowledge to get into R & D and industrial sector.

**PSO6**

The knowledge acquired during the course will make the students to think, innovate and help to make original contribution to the domain knowledge.

**PSO7**

The inter-disciplinary knowledge gained during the course will help the student to understand a problem in a better way and would be able to address the problem with a complete understanding.

**Eligibility for Admission**

The candidates who have passed the three year B Sc degree examination of Mangalore University or any other University considered equivalent there to, with Physics as major / optional subject/special subject are eligible for the programme provided they have studied Mathematics as major/optional/special/minor/subsidiary subject for at least two years and secured a minimum of 45% (40% for SC/ST/Category-I candidates) marks in Physics and Mathematics.

**Course Pattern Highlights**

- i) The M.Sc (Physics) PG Programme shall comprise “Core” and “Elective” subjects. The “Core” subjects shall further consists of “Hard” and “Soft” papers. Hard core papers shall have 4 credits; soft core paper shall have 3or 4 credits. Open electives shall have 3 credits. Total credit for the programme shall be 92 including open electives.
- ii) Core papers are related to the discipline of the M.Sc (Physics) programme. Hard core papers are compulsorily studied by a student as a core requirement to complete the programme of M.Sc (Physics). Soft core papers are elective but are related to the discipline of the programme. Two open elective papers of 3 credits each shall be offered in the II and III semester by the department. Open elective will be chosen from an unrelated programme within the faculty or across the faculty.
- iii) Total credit for the M.Sc (Physics) programme is 92. Out of the total 92 credits of the programme, the hard core (H) shall make up 60.47 % of the total credits; soft core (S) is 39.53 % while the open electives (OE) will have a fixed 6 credits (3 credits - 2 papers).

**DEPARTMENT OF POSTGRADUATE STUDIES AND RESEARCH IN PHYSICS**  
**PROPOSED CBCS COURSE STRUCTURE**

Semester	Theory (Hard Core)/ Soft core	Credits	Practicals Soft/ Hard	Credits	Theory (Elective) Soft/hard	Credits	Theory (Open Elective)	Credits	Projects Hard/soft	Credits	Total credits
I	4 H	4x4=16	2 S	6	-	-	-	-	-	-	22
II	4 H	4x4=16	2 S	6	-	-	1	3	-	-	25
III	2 H	2x4=8	2 S	6	2 S	2x4=8	1	3	-	-	25
IV	2 H	2x4=8	-	-	2 S	2x4=8	-	-	1 H	4	20

Total credit from all the four semesters (I, II, III and IV): 22+25+25+20 = 92

**Details of course and credits for four semesters:**

Hard core credits with %	Soft core credits with %	Total credits hard+ soft without open elective	Open elective credits	Total credits hard +soft+ open elective
52 (60.47)	34 (39.53)	86	6	92

**NOTE:**

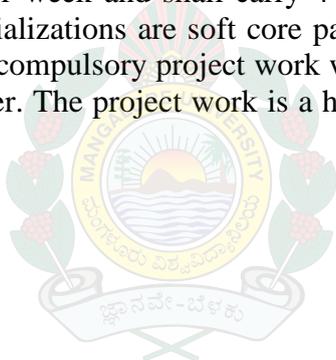
**FIRST SEMESTER:** The first semester consists of four theory papers which are hard core (4 hours per week for each paper and shall carry 4 credits for each paper) and two practicals (soft core 6 hours per week for each practical paper and each practical paper carries 3 credits). The duration of the lab is 3 hours. The students have to come twice a week for each of the practical paper.

**SECOND SEMESTER:** The second semester consists of four theory papers which are hard core (4 hours per week for each paper and shall carry 4 credits for each of the papers) and two practical (soft core 6 hours per week for each practical paper and each practical paper

shall carry 3 credits). The duration of the lab is 3 hours. The students have to come twice a week for each of the practical paper. In addition there shall be an open elective paper to be opted by the student from other departments. The open elective course is a soft core paper (3 hours per week and shall carry 3 credits).

**THIRD SEMESTER:** The third semester consists of four theory papers, two general theory papers and two elective papers. The elective papers are offered in each of the three specializations, condensed matter physics, electronics and nuclear physics. The two general papers are hard core (4 hours per week and shall carry 4 credits). The two elective papers offered in each of the three specializations are soft core papers (4 hours per week and shall carry 4 credits). The two practical papers for each of the above mentioned specialization are soft core papers (6 hours per week and shall carry 3 credits for each of the practical paper). The duration of the lab is 3 hours for each practical. The students have to come twice a week for each of the practical papers. In addition there is an open elective course to be opted by the student from other departments. The open elective is a soft core paper (3 hours per week and shall carry 3 credits).

**FOURTH SEMESTER:** The fourth semester consists of four theory papers, two general theory papers and two elective papers. The elective papers are offered in each of the three specializations, condensed matter physics, electronics and nuclear physics. The two general papers are hard core (4 hours per week and shall carry 4 credits). The two elective papers offered in each of the three specializations are soft core papers (4 hours per week and shall carry 4 credits). There shall be a compulsory project work which has to be under taken by all the students of the fourth semester. The project work is a hard core having 8 hours per week with 4 credits.



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**M Sc (Physics) Scheme of Examination, Marks and Credits**

SEMESTER	Theory/practicals	Exam. hours	Marks end Semester + Internal assessment	Credits	Total
I Semester	4 Theory papers (hard core)	3 hrs each	70 + 30* each	4 x 4 = 16	400
	Two practicals (soft core)	3 hrs each	70 + 30* each	2 x 3 = 6	200
II Semester	4 Theory papers(hard core)	3 hrs each	70 + 30* each	4 x 4 = 16	400
	Two practicals (soft core)	3 hrs each	70 + 30* each	2 x 3= 6	200
	One open elective (theory)	3 hrs	70 + 30* each	1x3 =3	100
III Semester	4 Theory Papers i) Two hard core (4 credits) ii) Two soft core (4 credits)	3 hrs each	70 + 30* each	2x 4 = 8 2 x 4 = 8	400
	Two practicals (soft core)	3 hrs each	70 + 30* each	2 x 3 = 6	200
	One open elective (theory)	3 hrs	70 + 30* each	1 x3=3	100
IV Semester	4 Theory Papers i) Two hard core (4 credits) ii) Two soft core (4 credits)	3 hrs each	70 + 30* each	2 x 4 = 8 2 x 4= 8	400
	Project (hard core)		70 + 30*	1 x 4 = 4	100
			Grand Total	92	2500

\*Internal Assessment

**NOTE:**

**BASIS FOR INTERNAL ASSESSMENT:**

Internal assessment marks in theory papers shall be based on two tests in each theory paper and the total internal assessment marks for each subject is 30. Practical internal assessment marks is based on viva voce and practical records in the semesters and carries 30 marks for each practical paper. The Project internal assessment 30 marks is based on the regular performance of the student during the project work.

**Project Report:** There shall be a project in the fourth semester for all the specializations. The project report shall be in the form of a dissertation. Out of 100 marks for the project, 30 marks will be for Internal Assessment and the remaining 70 marks will be based on the content of the Project Report and performance of the student in the Viva-voce examination. The evaluation of the project report and viva-voce examination will be done by two examiners (one internal and one external) from the panel of examiners prepared by the BoS and approved by the University.

MANGALORE UNIVERSITY  
**M Sc DEGREE PROGRAMME IN PHYSICS: SEMESTER SCHEME**  
 (Effective from the Academic year 2020- 2021)

**COURSE PATTERN AND SCHEME OF EXAMINATION**

SEMESTER	Description of the Papers	Teaching Hrs/ week	Credit Hard(H)/Soft(S)/ Open elective(OE)	Max Marks: Exam + IA = Total
<b>I SEMESTER</b>				
PHH 401	Methods of Mathematical Physics - I	4	4 H	70 + 30
PHH 402	Quantum Mechanics I	4	4 H	70 + 30
PHH 403	Classical Mechanics	4	4 H	70 + 30
PHH 404	Electrodynamics	4	4 H	70 + 30
PHP 405	Physics Practicals I (General)	6	3 S	70 + 30
PHP 406	Physics Practicals II (General)	6	3 S	70 + 30
<b>II SEMESTER</b>				
PHH 451	Mathematical Physics II	4	4 H	70 + 30
PHH 452	Quantum Mechanics II	4	4 H	70 + 30
PHH 453	Nuclear and Radiation Physics	4	4 H	70 + 30
PHH 454	Condensed Matter Physics and Electronics	4	4 H	70 + 30
PHE 455	Energy studies	3	3S (OE)	70 + 30
PHP 456	Physics Practicals III (General)	6	3 S	70 + 30
PHP 457	Physics Practicals IV (Electronics)	6	3 S	70 + 30

<b>III SEMESTER</b>				
PHH 501	Atomic and Molecular Physics	4	4 H	70 + 30
PHH 502	Thermodynamics and Statistical Physics	4	4 H	70 + 30
PHS 503	Condensed Matter Physics I	4	4 S	70 + 30
PHS 504	Electronics I	4	4 S	70 + 30
PHS 505	Nuclear Physics I	4	4 S	70 + 30
PHS 506	Condensed Matter Physics II	4	4 S	70 + 30
PHS 507	Electronics II	4	4 S	70 + 30
PHS 508	Nuclear Physics II	4	4 S	70 + 30
PHE 509	Radiation Sources and Hazards	3	3 S (OE)	70+30
PHP 510	Condensed Matter Physics - Practicals I	6	3 S	70 + 30
PHP 511	Electronics - Practicals I	6	3 S	70 + 30
PHP 512	Nuclear Physics – Practicals I	6	3 S	70 + 30
PHP 513	Condensed Matter Physics - Practicals II	6	3 S	70 + 30
PHP 514	Electronics - Practicals II	6	3 S	70 + 30
PHP 515	Nuclear Physics – Practicals II	6	3 S	70 + 30
<b>IV SEMESTER</b>				
PHH 551	Lasers, Vacuum Techniques and Cryogenics	4	4 H	70 + 30
PHH 552	Astrophysics and Relativity	4	4 H	70 + 30
PHS 553	Condensed Matter Physics III	4	4 S	70 + 30
PHS 554	Electronics III	4	4 S	70 + 30
PHS 555	Nuclear Physics III	4	4 S	70 + 30
PHS 556	Condensed Matter Physics IV	4	4 S	70 + 30
PHS 557	Electronics IV	4	4 S	70 + 30
PHS 558	Nuclear Physics IV	4	4 S	70 + 30
PHP 559	Project work	8	4 H	70+30