REVISED SYLLABUS ACCORDING TO CBCS NEP2020 SECOND-YEAR OF MASTER OF SCIENCE IN PHYSICS

COURSE TITLE:- NUCLEAR PHYSICS
SEMESTER - III
W.E.F. 2024 - 2025

RECOMMENDED BY THE BOARD OF STUDIES IN PHYSICS
AND
APPROVED BY THE ACADEMIC COUNCIL

Devrukh Shikshan Prasarak Mandal's
Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh.
Tal.Sangmeshwar, Dist. Ratnagiri-415804, Maharashtra, India

Academic Council Item No: **dated 19 April 2024**

Name of the Implementing Institute	:	Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh. Tal. Sangmeshwar, Dist. Ratnagiri-415804,
Name of the Parent University	:	University of Mumbai
Name of the Programme	:	Master of Science
Name of the Department	:	Physics
Name of the Class	:	Second Year
Semester	:	Third
No. of Credits	:	02
Title of the Course	:	Nuclear Physics
Course Code	:	S605PHT
Name of the Vertical in adherence to NEP 2020	:	Elective
Eligibility for Admission	:	Any student admitted to Second year of M.Sc, degree programme in adherence to Rules and Regulations of the University of Mumbai and Government of Maharashtra.
Passing Marks	:	40%
Mode of Assessment	:	Formative and Summative
Level	:	PG
Pattern of Marks Distribution for SEE and CIA	:	60:40
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2024 - 2025

Syllabus for First Year of Master of Science in Physics

(With effect from the academic year 2024 - 2025)

SEMESTER - III **Paper No.– Physics Paper – V**

Course Title: Lab – Nuclear Physics **No. of Credits - 02**

Type of Vertical: Elective **COURSE CODE: S605PHT**

Learning Outcomes Based on BLOOM's Taxonomy:

After completing the course, the learner will be able to…

Course Learning Outcome No.	Blooms Taxonomy	Course Learning Outcome
CLO-01	Remember	Know the properties of Atomic Nuclei
CLO-02	Understand	Understand the Deuteron problem
CLO-03	Understand	Understand alpha decay and gamma decay processes
CLO-04	Understand	Understand the beta decay process and Fermi theory
CLO-05	Apply	Solve problems based on the theory of the paper

Syllabus for First Year of Master of Science in Physics

(With effect from the academic year 2024 - 2025)

SEMESTER - III **Paper No.–Physics Paper – V**

Course Title: Lab – Nuclear Physics **No. of Credits - 02**

Type of Vertical: Elective **COURSE CODE: S605PHT**

COURSE CONTENT			
Module No.	**Content**	**Credits**	**No. of Lectures**
1	All static properties of nuclei (charge, mass, binding energy, size, shape, angular momentum, magnetic dipole momentum, electric quadrupole momentum, statistics, parity, isospin), Measurement of Nuclear size and estimation of R0 (mirror nuclei and mesonic atom method) Deuteron Problem and its ground state properties, Estimate the depth and size of (assume) square well potential, Tensor force as an example of non-central force, nucleon-nucleon scattering-qualitative discussion on results, Spin-orbit strong Interaction between nucleon, double scattering experiment.	**01**	**15**
2	Review of alpha decay, Introduction to Beta decay and its energetic, Fermi theory: derivation of Fermi's Golden rule, Information from Fermi–curie plots, Comparative half-lives, selection rules for Fermi and G-T transitions. Gamma decay: Multipole radiation, Selection rules for gamma ray transitions, Gamma ray interaction with matter, and Charge-particle interaction with matter.	**01**	**15**
	Total	**02**	**30**

References Books:

1. Introductory Nuclear Physics, Kenneth Krane, Wiley India Pvt. Ltd.
2. Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles, Robert Eisberg and Robert Resnick, Wiley (2006)
3. Introduction to Nuclear Physics, H. A. Enge, Eddison Wesley
4. Nuclei and Particles, E. Segre, W. A. Benjamin
5. Concepts of Nuclear Physics, B. L. Cohen
6. Subatomic Particles, H. Fraunfelder and E. Henley, Prentice Hall
7. Introduction to Nuclear and Particle Physics, A. Das & T. Ferbel, World Scientific
8. Introduction to high energy physics, D. H. Perkins, Addison Wesley
9. Nuclear and Particle Physics, W. E. Burcham and M. Jones, Addison Wesley
10. Introductory Nuclear Physics, S. M. Wong, Prentice Hall.
11. Nuclear Physics: An Introduction, S. B. Patel, New Age International.
12. Nuclear Physics : S. N. Ghoshal
13. Nuclear Physics: Roy and Nigam

Access to the Course

The course is available for all the students admitted for Master of Science in Physics.

Methods of Assessment

The assessment pattern would be 60:40, 60% for Semester End Examination (SEE) and 40% for Continuous Internal Assessment (CIA). The structure of the SEE and CIA would be as recommended by the Board of Studies and approved by the Board of Examination and the Academic Council of the college.

Pattern of Evaluation

The Examination/Evaluation pattern shall be framed by the Board of Examination with its final approval from the Academic Council of the College.