THIRD YEAR OF BACHELOR OF SCIENCE MAJOR PHYSICS REVISED SYLLABUS ACCORDING TO CBCS NEP2020

COURSE TITLE: NANOMATERIALS AND APPLICATION LAB

SEMESTER-V W.E.F. 2025-2026

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: 02/2025

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	:	Bachelor of Science
Name of the Department	:	Physics
Name of the Class	:	Third Year
Semester	:	Fifth
Paper	:	Elective Practical II
No. of Credits	:	02
Title of the Course	:	**Nanomaterial and Applications Lab**
Course Code	:	S309PHP
Name of the Vertical in adherence to NEP 2020	:	Elective
Eligibility for Admission	:	Any student admitted to Second year of B. Sc, degree programme in adherence to Rules and Regulations of the University of Mumbai and Government of Maharashtra
Passing Marks	:	40%
Mode of Assessment	:	Summative at the end of semester
Level	:	5.5
Pattern of Marks Distribution for TE and CIA	:	100 %
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2025-2026
Ordinances /Regulations (if any)		

Syllabus for Third Year of Bachelor of Science in Physics

(With effect from the academic year 2025-2026)

Semester: V **Paper No : Elective Practical– II**

Course Title: Nanomaterial and Applications Lab **No. of Credits – 02**

Type of Vertical: Elective **Course Code: S309PHP**

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

Course Outcome	Course Learning Outcome
CO-01	Understand practical skills while performing experiments
CO-02	Understand the use of apparatus and their use without fear & hesitation
CO-03	Correlate the physics theory concepts to practical application
CO-04	Understand the concept of errors and their estimation.

1. The certified journal must contain a minimum of **12** experiments in semester-V.
2. A separate index and certificate in journal is must for each semester course.

Syllabus for Third Year of Bachelor of Science in Physics
(With effect from the academic year 2025-2026)

Semester-V **Paper No – II**
Course Title: Nanomaterial and Applications Lab **No. of Credits – 02**

Type of Vertical: Elective II **Course Code: S309PHP**

Elective Practicals

1. Synthesis of metal nanoparticles by chemical route
2. Synthesis of metal nanoparticles by Physical route
3. Synthesis of semiconductor nanoparticles.
4. Synthesis of alloy nanoparticles
5. Surface Plasmon study of metal nanoparticles by UV-Visible spectrophotometer
6. XRD pattern of nanomaterials and estimation of particle size.
7. To study the effect of size on color of nanomaterials.
8. To prepare composite of CNTs with other materials.
9. Growth of quantum dots by thermal evaporation.
10. Prepare a disc of ceramic of a compound-using ball milling and sintering and study its XRD.
11. Prepare a disc of ceramic of a compound using pressing and sintering and study it's XRD.
12. Fabricate a thin film of nanoparticles by spin coating (or chemical route) and study transmittance spectra in UV-Visible region.
13. Prepare a thin film capacitor and measure capacitance as a function of temperature or frequency
14. Fabricate a PN diode by diffusing Al over the surface of N-type Si and study its V-I characteristic

References:

1. C.P. Poole, Jr. Frank J. Owens, Introduction to Nanotechnology (Wiley India Pvt. Ltd.).
2. S.K. Kulkarni, Nanotechnology: Principles & Practices (Capital Publishing Company).
3. K.K. Chattopadhyay and A.N. Banerjee, Introduction to Nanoscience & Technology (PHI Learning Private Limited).
4. Richard Booker, Earl Boysen, Nanotechnology (John Wiley and Sons).

Access to the Course

The course is available for all the students admitted for third year of Bachelor of Science.

Methods of Assessment

Vocational Skill Courses, Skill Enhancement Courses and the courses having laboratory sessions shall be assessed at the end of each semester.

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.