



## **SARADHA GANGADHARAN COLLEGE**

(Affiliated to Pondicherry University)

(Recognized by UGC under Section 2(f) of the UGC Act 1956 as PG Institution) (Accredited by NACC)(ISO 9001:2015 Certified institution) (Registered with SWAYAM Local Chapter)  
Lake Road, Velrampet, Puducherry-4

### **DEPARTMENT OF PHYSICS**

### **CERTIFICATE COURSE IN NANO SCIENCE AND NANOTECHNOLOGY**

**(ADD-ON COURSE) For the Session 2020-2021**

#### **COURSE OBJECTIVE**

Nano science and Nanotechnology is a relative young multi-disciplinary field with riveting development and promising potential job creating science. Nanoscience is one the advance technique in science which helps to determine the particle's size, size distribution, molecular weight, density, surface area, porosity, hydrophilicity, surface charge density, purity, surface chemistry, and stability. This course builds strong foundation and train the students develop strong flair over science with a refined understanding of the underlying principles. The add on course imparts knowledge of the fundamental concepts to the target community.

#### **COURSE STRUCTURE**

- ❖ Introduction to nano-science and nanotechnology
- ❖ Synthesis of Nano-materials
- ❖ Properties of Nano materials



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Lake Road, Velrampet, Puducherry-4

### **DEPARTMENT OF PHYSICS**

### **CERTIFICATE COURSE IN NANO SCIENCE AND NANOTECHNOLOGY**

**(ADD-ON COURSE) For the Session 2020-2021**

#### **COURSE OBJECTIVE**

Nano science and Nanotechnology is a relative young multi-disciplinary field with riveting development and promising potential job creating science. Nanoscience is one the advance technique in science which helps to determine the particle's size, size distribution, molecular weight, density, surface area, porosity, hydrophilicity, surface charge density, purity, surface chemistry, and stability. This course builds strong foundation and train the students develop strong flair over science with a refined understanding of the underlying principles. The add on course imparts knowledge of the fundamental concepts to the target community.

#### **COURSE STRUCTURE**

- ❖ Introduction to nano-science and nanotechnology
- ❖ Synthesis of Nano-materials
- ❖ Properties of Nano materials

### ELIGIBILITY FOR CERTIFICATE COURSE

- Students who have passed under graduate level in Physics.
- Students can take this Add-on course only during their graduation period.

### WORKLOAD & DISTRIBUTION OF MARKS

- The total tutorial hours for the prescribed course is 40 hours.
- Two hours from the main paper slot are to be dedicated to this Add-on course.
- The overall syllabus has to be completed in a period of 3 months.
- The evaluation pattern comprise of assignments and external examination with a weightage of 40: 60 distribution.

### COURSE FACILITATORS

Department Faculty members

### INSTRUCTIONS FOR PAPER SETTERS

Examiner will be required to take 20 Objective type Questions with Multiple Choice each carrying 1 mark.

Course title	Theory	Assignment	Max.Marks
Nanoscience and technology	30	20	50

Date of Commencement	:	03 May 2021
Duration	:	40 Hours
Venue	:	Google Meet

## Syllabus

### Nano science and Nanotechnology

#### Unit-1

Introduction to nano-science and nanotechnology.-Multidisciplinary nature. Scale of Nano regime. Size dependence of physical properties. Surface to volume ratio. Types of nano material- Zero Dimensional Material-One Dimensional materials-Two Dimensional materials-Three Dimensional materials.

#### Unit-2

Synthesis of Nano-materials Physical Approach -Arc Discharge method- Laser Ablation-Aerosol Synthesis-Ball milling-CVD - plasma –synthesis Electro deposition Chemical Approach-Solvothermal synthesis- Hydrothermal synthesis- Micro-emulsion –Sol-gel- Microwave method-sono-chemical process Co-precipitation –Self Assembly Method

#### Unit -3

Properties- Mechanical nano- materials-Electrical nano-materials- Magnetic nano- materials-Optical –nano-materials Characterization of nano- materials- TEM –SEM- EDAX-Atomic force field – Spectroscopic studies. Application- Medicine- Electronics- Sensors-

#### Text:

1. M.A. Shah Tokeer Ahmad, Principle of Nano-science and Nanotechnology, Narosa- NewDelhi.
2. Rakesh Rathj, Nanotechnolgy, S.Chand-New Delhi.

**Certificate Course: Nano science and Nanotechnology**

**Date of Commencement : 03.05.2021**

S.NO	NAME OF THE STUDENT	Register No.	Program Name	3-May	4-May	5-May	6-May	7-May	10-May	11-May	12-May	13-May	17-May	18-May	19-May
1	Archana.D	18PH0601	B.Sc PHY (2018-2021)	1	2	3	4	A	5	6	7	8	9	10	11
2	Bhuvana.T	18PH0602	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12
3	Gayathri.C	18PH0603	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12
4	Keerthana.R	18PH0604	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12
5	Kirupakaran.K	18PH0605	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	A	8	9	10	A
6	Krishnakumar.V	18PH0606	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12
7	Lokesh varma.M	18PH0607	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12
8	Manoj.N	18PH0608	B.Sc PHY (2018-2021)	1	2	3	4	5	6	A	7	A	8	A	9
9	Mohana priya.R	18PH0609	B.Sc PHY (2018-2021)	1	2	3	4	A	5	6	7	8	A	A	A
10	Mukunthan.D	18PH0610	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12
11	Nishaanthi.K.A	18PH0611	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	A	8	9	10	11
12	Parthasarathy.S	18PH0612	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	A	8	9	10	11
13	Pavithra.D	18PH0613	B.Sc PHY (2018-2021)	1	2	3	4	5	6	A	7	8	A	A	9
14	Praveena.S	18PH0614	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12

15	Raisha parvin.A.S	18PH0615	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	A	11	A
16	Rajalakshmi.R	18PH0616	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	A	8	9	10	11
17	Samyuktha.E.K	18PH0617	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12
18	Sanjai.G	18PH0618	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12
19	Saranya.M	18PH0620	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12
20	Sathya kumar.S	18PH0621	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	A	A	8	9	10
21	Siddharth.S	18PH0622	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12
22	Sivasankari.I	18PH0623	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12
23	Sneha.S	18PH0624	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	A	8	9	10	11
24	Sudhan.R	18PH0625	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12
25	Suvetha.A	18PH0626	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	A	A	8	9	10
26	Vahini.G	18PH0627	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12
27	Vannmathy.v	18PH0628	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12
28	Venkateswaran.P	18PH0629	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12
29	Vigneshwaran.V	18PH0630	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12

30	Vijay.K	18PH0631	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12
31	Vijayalakshmi.R	18PH0632	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12
32	Vinitha.P	18PH0634	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12
33	Vishwa.C	18PH0635	B.Sc PHY (2018-2021)	1	2	3	4	5	6	7	8	9	10	11	12

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**DEPARTMENT OF PHYSICS**

**Certificate Course: Nano science and Nanotechnology**

**Date of Commencement : 03.05.2021**

S.NO	NAME OF THE STUDENT	Register No.	Program Name	20- May	21- May	27- May	28- May	3- Jun	4- Jun	7- Jun	8- Jun	9- Jun	10- Jun	
1	Archana.D	18PH0601	B.Sc PHY (2018-2021)	12	13	14	15	16	A	17	18	19	20	
2	Bhuvana.T	18PH0602	B.Sc PHY (2018-2021)	13	14	15	16	17	18	19	20	21	22	
3	Gayathri.C	18PH0603	B.Sc PHY (2018-2021)	13	14	15	16	17	18	19	20	21	22	
4	Keerthana.R	18PH0604	B.Sc PHY (2018-2021)	13	14	15	16	17	18	19	20	21	22	
5	Kirupakaran.K	18PH0605	B.Sc PHY (2018-2021)	A	A	11	12	13	A	14	15	16	17	
6	Krishnakumar.V	18PH0606	B.Sc PHY (2018-2021)	13	14	15	16	12	13	14	15	A	A	

7	Lokesh varma.M	18PH0607	B.Sc PHY (2018-2021)	13	14	15	16	17	18	19	20	21	22	
8	Manoj.N	18PH0608	B.Sc PHY (2018-2021)	10	A	11	12	13	A	A	14	15	16	
9	Mohana priya.R	18PH0609	B.Sc PHY (2018-2021)	A	A	9	10	11	12	13	14	15	16	
10	Mukunthan.D	18PH0610	B.Sc PHY (2018-2021)	13	14	15	16	17	18	19	20	21	22	
11	Nishaanthi.K.A	18PH0611	B.Sc PHY (2018-2021)	12	13	A	14	15	16	17	A	18	19	
12	Parthasarathy.S	18PH0612	B.Sc PHY (2018-2021)	12	13	A	14	15	16	17	A	18	19	
13	Pavithra.D	18PH0613	B.Sc PHY (2018-2021)	10	11	12	13	14	15	16	17	18	19	
14	Praveena.S	18PH0614	B.Sc PHY (2018-2021)	13	14	15	16	17	18	19	20	21	22	
15	Raisha parvin.A.S	18PH0615	B.Sc PHY (2018-2021)	12	A	13	14	A	15	16	17	18	19	
16	Rajalakshmi.R	18PH0616	B.Sc PHY (2018-2021)	12	13	A	14	15	16	17	A	18	19	
17	Samyuktha.E.K	18PH0617	B.Sc PHY (2018-2021)	13	14	15	16	17	18	19	20	21	22	
18	Sanjai.G	18PH0618	B.Sc PHY (2018-2021)	13	14	15	16	17	18	19	20	21	22	
19	Saranya.M	18PH0620	B.Sc PHY (2018-2021)	13	14	15	16	17	18	19	20	21	22	
20	Sathya kumar.S	18PH0621	B.Sc PHY (2018-2021)	11	A	A	12	13	14	A	15	A	16	
21	Siddharth.S	18PH0622	B.Sc PHY (2018-2021)	13	14	15	16	17	18	19	20	21	22	



22	Sivasankari.I	18PH0623	B.Sc PHY (2018-2021)	13	14	15	16	17	18	19	20	21	22
23	Sneha.S	18PH0624	B.Sc PHY (2018-2021)	12	13	A	14	15	16	17	A	18	19
24	Sudhan.R	18PH0625	B.Sc PHY (2018-2021)	13	14	15	16	17	18	19	20	21	22
25	Suvetha.A	18PH0626	B.Sc PHY (2018-2021)	11	12	13	14	15	16	17	18	19	20
26	Vahini.G	18PH0627	B.Sc PHY (2018-2021)	13	A	14	15	A	A	16	17	18	A
27	Vannmathy.v	18PH0628	B.Sc PHY (2018-2021)	13	14	15	16	17	18	19	20	21	22
28	Venkateswaran.P	18PH0629	B.Sc PHY (2018-2021)	13	14	15	16	17	18	19	20	A	A
29	Vigneshwaran.V	18PH0630	B.Sc PHY (2018-2021)	13	14	15	16	17	18	19	20	21	22
30	Vijay.K	18PH0631	B.Sc PHY (2018-2021)	13	14	15	16	17	18	19	20	21	22
31	Vijayalakshmi.R	18PH0632	B.Sc PHY (2018-2021)	13	14	15	16	17	18	19	20	21	22
32	Vinitha.P	18PH0634	B.Sc PHY (2018-2021)	A	A	11	12	15	16	17	A	18	19
33	Vishwa.C	18PH0635	B.Sc PHY (2018-2021)	13	14	15	16	17	18	19	20	21	22

**SARADHA GANGADHARAN COLLEGE****DEPARTMENT OF PHYSICS****Certificate Course: Nano science and Nanotechnology****Date of Commencement : 03.05.2021**

S.NO	NAME OF THE STUDENT	Register No.	Program Name	11-Jun	14-Jun	15-Jun	16-Jun	17-Jun	18-Jun	22-Jun	23-Jun	24-Jun	25-Jun
1	Archana.D	18PH0601	B.Sc PHY (2018-2021)	21	22	23	24	25	26	27	A	28	29
2	Bhuvana.T	18PH0602	B.Sc PHY (2018-2021)	23	24	25	26	27	28	29	30	31	32
3	Gayathri.C	18PH0603	B.Sc PHY (2018-2021)	23	24	25	26	27	28	29	30	31	32
4	Keerthana.R	18PH0604	B.Sc PHY (2018-2021)	23	24	25	26	27	28	29	30	31	32
5	Kirupakaran.K	18PH0605	B.Sc PHY (2018-2021)	18	19	20	21	22	A	A	A	23	24
6	Krishnakumar.V	18PH0606	B.Sc PHY (2018-2021)	16	17	18	19	20	21	22	23	24	25
7	Lokesh varma.M	18PH0607	B.Sc PHY (2018-2021)	23	24	25	26	27	28	29	30	31	32
8	Manoj.N	18PH0608	B.Sc PHY (2018-2021)	17	18	19	20	21	22	23	24	25	26
9	Mohana priya.R	18PH0609	B.Sc PHY (2018-2021)	17	18	19	20	21	22	23	24	25	26
10	Mukunthan.D	18PH0610	B.Sc PHY (2018-2021)	23	24	25	26	27	28	29	30	31	32
11	Nishaanthi.K.A	18PH0611	B.Sc PHY (2018-2021)	A	20	21	22	23	24	25	26	A	27

12	Parthasarathy.S	18PH0612	B.Sc PHY (2018-2021)	A	20	21	22	23	24	25	26	A	27
13	Pavithra.D	18PH0613	B.Sc PHY (2018-2021)	20	21	22	23	24	25	26	27	28	29
14	Praveena.S	18PH0614	B.Sc PHY (2018-2021)	23	24	25	26	27	28	29	30	31	32
15	Raisha parvin.A.S	18PH0615	B.Sc PHY (2018-2021)	20	21	22	23	24	25	26	27	28	29
16	Rajalakshmi.R	18PH0616	B.Sc PHY (2018-2021)	A	20	21	22	23	24	25	26	A	27
17	Samyuktha.E.K	18PH0617	B.Sc PHY (2018-2021)	23	24	25	26	27	28	29	30	31	32
18	Sanjai.G	18PH0618	B.Sc PHY (2018-2021)	23	24	25	26	27	28	29	30	31	32
19	Saranya.M	18PH0620	B.Sc PHY (2018-2021)	23	24	25	26	27	28	29	30	31	32
20	Sathya kumar.S	18PH0621	B.Sc PHY (2018-2021)	17	18	19	20	21	22	23	24	25	26
21	Siddharth.S	18PH0622	B.Sc PHY (2018-2021)	23	24	25	26	27	28	29	30	31	32
22	Sivasankari.I	18PH0623	B.Sc PHY (2018-2021)	23	24	25	26	27	28	29	30	31	32
23	Sneha.S	18PH0624	B.Sc PHY (2018-2021)	A	20	21	22	23	24	25	26	A	27
24	Sudhan.R	18PH0625	B.Sc PHY (2018-2021)	23	24	25	26	27	28	29	30	31	32
25	Suvetha.A	18PH0626	B.Sc PHY (2018-2021)	A	A	21	22	A	A	23	24	25	26
26	Vahini.G	18PH0627	B.Sc PHY (2018-2021)	19	20	21	22	23	24	25	26	27	28

27	Vannmathy.v	18PH0628	B.Sc PHY (2018-2021)	23	24	25	26	27	28	29	30	31	32
28	Venkateswaran.P	18PH0629	B.Sc PHY (2018-2021)	A	A	A	21	22	23	24	25	26	27
29	Vigneshwaran.V	18PH0630	B.Sc PHY (2018-2021)	23	24	25	26	27	28	29	30	31	32
30	Vijay.K	18PH0631	B.Sc PHY (2018-2021)	23	24	25	26	27	28	29	30	31	32
31	Vijayalakshmi.R	18PH0632	B.Sc PHY (2018-2021)	23	24	25	21	22	23	24	25	26	27
32	Vinitha.P	18PH0634	B.Sc PHY (2018-2021)	A	20	21	26	27	28	29	30	31	32
33	Vishwa.C	18PH0635	B.Sc PHY (2018-2021)	23	24	25	26	27	28	29	30	31	32

**DEPARTMENT OF PHYSICS**

**Certificate Course: Nano science and Nanotechnology**

**Date of Commencement : 03.05.2021**

S.NO	NAME OF THE STUDENT	Register No.	Program Name	29-Jun	30-Jun	2-Jul	5-Jul	6-Jul	7-Jul	8-Jul
1	Archana.D	18PH0601	B.Sc PHY (2018-2021)	31	32	33	34	35	36	37
2	Bhuvana.T	18PH0602	B.Sc PHY (2018-2021)	34	35	36	37	38	39	40
3	Gayathri.C	18PH0603	B.Sc PHY (2018-2021)	34	35	36	37	38	39	40
4	Keerthana.R	18PH0604	B.Sc PHY (2018-2021)	34	35	36	37	38	39	40
5	Kirupakaran.K	18PH0605	B.Sc PHY (2018-2021)	26	27	28	29	30	31	32
6	Krishnakumar.V	18PH0606	B.Sc PHY (2018-2021)	27	28	29	30	31	32	33
7	Lokesh varma.M	18PH0607	B.Sc PHY (2018-2021)	34	35	36	37	38	39	40
8	Manoj.N	18PH0608	B.Sc PHY (2018-2021)	28	29	30	31	32	33	34
9	Mohana priya.R	18PH0609	B.Sc PHY (2018-2021)	28	29	30	31	32	A	33
10	Mukunthan.D	18PH0610	B.Sc PHY (2018-2021)	34	35	36	37	38	39	40
11	Nishaanthi.K.A	18PH0611	B.Sc PHY (2018-2021)	29	30	31	32	33	A	A
12	Parthasarathy.S	18PH0612	B.Sc PHY (2018-2021)	29	30	31	32	33	A	A

13	Pavithra.D	18PH0613	B.Sc PHY (2018-2021)	31	32	33	34	35	36	37
14	Praveena.S	18PH0614	B.Sc PHY (2018-2021)	34	35	36	37	38	39	40
15	Raisha parvin.A.S	18PH0615	B.Sc PHY (2018-2021)	31	32	33	34	35	36	37
16	Rajalakshmi.R	18PH0616	B.Sc PHY (2018-2021)	29	30	31	32	33	A	A
17	Samyuktha.E.K	18PH0617	B.Sc PHY (2018-2021)	34	35	36	37	38	39	40
18	Sanjai.G	18PH0618	B.Sc PHY (2018-2021)	34	35	36	37	38	39	40
19	Saranya.M	18PH0620	B.Sc PHY (2018-2021)	34	35	36	37	38	39	40
20	Sathya kumar.S	18PH0621	B.Sc PHY (2018-2021)	28	29	30	31	32	33	34
21	Siddharth.S	18PH0622	B.Sc PHY (2018-2021)	34	35	36	37	38	39	40
22	Sivasankari.I	18PH0623	B.Sc PHY (2018-2021)	34	35	36	37	38	39	40
23	Sneha.S	18PH0624	B.Sc PHY (2018-2021)	29	30	31	32	33	A	A
24	Sudhan.R	18PH0625	B.Sc PHY (2018-2021)	34	35	36	37	38	39	40
25	Suvetha.A	18PH0626	B.Sc PHY (2018-2021)	28	29	30	31	32	33	34
26	Vahini.G	18PH0627	B.Sc PHY (2018-2021)	30	31	32	33	34	35	36
27	Vannmathy.v	18PH0628	B.Sc PHY (2018-2021)	34	35	36	37	38	39	40

28	Venkateswaran.P	18PH0629	B.Sc PHY (2018-2021)	29	30	31	32	33	34	35
29	Vigneshwaran.V	18PH0630	B.Sc PHY (2018-2021)	34	35	36	37	38	39	40
30	Vijay.K	18PH0631	B.Sc PHY (2018-2021)	34	35	36	37	38	39	40
31	Vijayalakshmi.R	18PH0632	B.Sc PHY (2018-2021)	29	30	31	32	33	34	35
32	Vinitha.P	18PH0634	B.Sc PHY (2018-2021)	34	35	36	37	38	39	40
33	Vishwa.C	18PH0635	B.Sc PHY (2018-2021)	34	35	36	37	38	39	40

*K. Sureshchi*  
Signature of the coordinator

*K. Sureshchi*  
Signature of the HOD



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Report on nano science on technology Add-on course –May-Jun-21

The add on course on Nano science and technology was intimated to the final year graduate students. All the final year students in third year B.Sc(Physics) class were enrolled. We have conducted Nano science and technology certificate course from 3.5.21 to 8.7.21. The syllabus was completed in 40 hours. The attendance was highly encouraged. After the completion of certain topics, assignments were given. At the end of the course, external examination was conducted. The participants expressed satisfaction on the successful completion of the course.

  
Signature of the coordinator

  
Signature of the HOD





# SARADHA GANGADHARAN COLLEGE

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NAAC Accredited Institution

ISO 9001:2015 Certified Institution

## CERTIFICATE OF COMPLETION

This is to certify that  
**KRISHNA KUMAR.V**  
of

**BSc Physics (2018-2021)** has completed the add-on Course  
“**Nanoscience and Nanotechnology**”  
Offered in the Academic Year 2020-2021

*K. Swaminathan*  
**Coordinator**

*K. Swaminathan*  
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