

Course Name: Basics of Nano and Soft Matter**Course Code:** CeNS-NS**Course Coordinator:**Dr.PralaySantra**Course Duration:** Sep 2021 – Dec 2021**Course Credit:** 2:0**Regular time:** 11.30 am – 12.30 pm

SL. No	DATE	INSTRUCTOR	TOPICS
1	8 Sep (Wed) 3.00 – 4.00 pm	Prof. BLV Prasad	Concepts and Definitions: nanoscale processes, nanosystems, important nanomaterials, historical account
2	13 Sep (Mon)	Dr. S. Angappane	Magnetism
3	17 Sep (Fri)	Dr. S. Angappane	Structure of materials; XRD of nanomaterials; Debye Sherer equation etc
4	20 Sep (Mon)	Dr.Neena John	Synthesis: top-down and bottom-up, hybrid methods
5	24 Sep (Fri)	Prof. BLV Prasad	Surface modifications, Anisotropy
6	27 Sep (Mon)	Prof. BLV Prasad	Optical properties of metal nanoparticles
7	1 Oct (Fri)	Dr.PralaySantra	Quantum confinement effect and surface effects in nanosystems; Optical properties of semiconducting nanomaterials
8	4 Oct (Mon)	Dr.PralaySantra	Electronic structure of semiconductor, work function, Fermi energy, conduction and valence band, direct and indirect band gap materials; p and n type material, p – n junction
9	8 Oct (Fri)	Dr.HSSR Matte	Carbon nanomaterials: fullerenes, nanotubes and graphene; analogues and hybrids - I
10	11 Oct (Mon)	Dr.HSSR Matte	Carbon nanomaterials: fullerenes, nanotubes and graphene; analogues and hybrids – II
11	22 Oct (Fri)	Dr.Kavitha Pandey	Basics of electrochemistry
12	25 Oct (Mon)	Dr.Veena Prasad	Chemistry of conventional and unconventional low molar mass liquid crystals (LCs): Introduction to LCs, broad classification, molecular arrangement in different calamitic and discotic LCs, general molecular structural requirement for a mesogen, conventional and unconventional LCs with examples, different approaches to obtain mesogens, basic characterization of LCs using POM and DSC.

13	29 Oct (Fri)	Dr.CVYelamaggad	Basic molecular structural needs for materials exhibiting mesomorphism, Driving forces for liquid crystal phase formation, Influence of Optical Activity, Monomers, Oligomers and Polymers
14	1 Nov (Mon)	Dr. S. Krishna Prasad	Overview of Soft Matter: Phenomenon of double melting: Plastic crystals and liquid crystals, Classification of liquid crystals: nematic, cholesteric and smectic phases
15	8 Nov (Mon)	Dr. S. Krishna Prasad	Order parameters for different liquid crystalline phases and their experimental determination, Critical phenomena
16	12 Nov (Fri)	Prof. K S Krishnamurthy	Liquid crystals: Optical, electrical and magnetic properties
17	15 Nov (Mon)	Dr. DS Shankar Rao	Diffraction of X-rays by liquids and liquid crystals, Information obtained from X-ray studies on liquid crystalline materials. Comparison between 2D and 3D crystallography
18	22 Nov (Mon)	Dr. Geetha Nair	Rheology of gels and liquid crystals
19	26 Nov (Fri)	Dr. S. Krishna Prasad	Applications of liquid crystals
20	29 Nov (Mon)	Dr. P. Viswanath	Surfactants, microemulsions, foam structure and foam stability; Surface and interfaces, surface tension, spreading of a liquid on another liquid, criteria for spreading. Liquid-liquid demixing, phase separation, spinodal decomposition
21	3 Dec (Fri)	Dr. P. Viswanath	Films on liquid substrates – Langmuir films, phases of monomolecular films, phase transition, mixed monolayers, surface manometry, Brewster angle microscopy and epifluorescence microscopy
22	6 Dec (Mon)	Dr. P. Viswanath	Films on solid substrates – Ellipsometry, spin coating, self assembled monolayers, Langmuir-Blodgett films. Contact angle measurements. Wetting and dewetting behavior. Adsorption isotherms