

Course Title: Basics of Nano and Soft Matter**Course Code: CeNS-NS****Course Credit: 2:0****Course Coordinator: Dr. Pralay K Santra**

Sl. No	Instructor	Date	Description
1	Prof. G U Kulkarni	05/10/2020 Mon 12:00 noon – 1:00 PM	Concepts and Definitions: nanoscale processes, nanosystems, important nanomaterials, historical account
2	Dr. S Krishna Prasad	07/10/2020 Wed 3:00 PM – 4:00 PM	Overview of Soft Matter: Phenomenon of double melting: Plastic crystals and liquid crystals, Classification of liquid crystals: nematic, cholesteric and smectic phases
3	Dr. S Krishna Prasad	09/10/2020 Fri 12:00 noon – 1:00 PM	Order parameters for different liquid crystalline phases and their experimental determination, Critical phenomena
4	Dr. S Angappane	12/10/2020 Mon 12:00 noon – 1:00 PM	Thin films: metal, semiconductor and organic films
5	Dr. S Angappane	14/10/2020 Wed 3:00 PM – 4:00 PM	Deposition techniques and thickness monitoring, growth modes, heterostructures
6	Dr. S Angappane	16/10/2020 Fri 12:00 noon – 1:00 PM	Nanolithography- concepts and methods: optical-, electron-, ion- beam lithography, micromolding, nanoimprint lithography, clean room practices
7	Dr. D S Shankar Rao	19/10/2020 Mon 12:00 noon – 1:00 PM	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
8	Dr. Geetha G Nair	21/10/2020 Wed 3:00 PM – 4:00 PM	Rheology of gels and liquid crystals
9	Prof. K S Krishnamurthy	23/10/2020 Mon 12:00 noon – 1:00 PM	Liquid crystals: Optical, electrical and magnetic properties
10	Dr. C V Yelamaggad	28/10/2020 Wed 3:00 PM – 4:00 PM	Basic molecular structural needs for materials exhibiting mesomorphism, Driving forces for liquid crystal phase formation, Influence of Optical Activity, Monomers, Oligomers and Polymers
11	Dr. Neena S John	02/11/2020 Mon 12:00 noon – 1:00 PM	Synthesis: top-down and bottom-up, hybrid methods
12	Dr. H S S R Matte	04/11/2020 Wed 3:00 PM – 4:00 PM	Carbon nanomaterials: fullerenes, nanotubes and graphene; analogues and hybrids - I
13	Dr. H S S R Matte	06/11/2020 Fri 12:00 noon – 1:00 PM	Carbon nanomaterials: fullerenes, nanotubes and graphene; analogues and hybrids – II

Sl. No	Instructor	Date	Description
14	Dr. Veena Prasad	09/11/2020 Mon 12:00 noon – 1:00 PM	Chemistry of conventional and unconventional low molar mass liquid crystals
15	Dr. Pralay K Santra	11/11/2020 Wed 3:00 PM – 4:00 PM	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
16	Dr. Pralay K Santra	13/11/2020 Fri 12:00 noon – 1:00 PM	Photovoltaics – working principle. Different types of solar cells and their working mechanism
17	Dr. Ashutosh K Singh	18/11/2020 Wed 3:00 PM – 4:00 PM	Importance of Nanomaterials in energy storage devices
18	Dr. Ashutosh K Singh	20/11/2020 Fri 12:00 noon – 1:00 PM	Transparent conducting electrodes (TCE) and their applications; Smart window technologies
19	Dr. P Viswanath	23/11/2020 Mon 12:00 noon – 1:00 PM	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
20	Dr. P Viswanath	25/11/2020 Wed 3:00 PM – 4:00 PM	Films on liquid substrates – Langmuir films, phases of monomolecular films, phase transition, mixed monolayers, surface manometry, Brewster angle microscopy and epifluorescence microscopy
21	Dr. P Viswanath	27/11/2020 Fri 12:00 noon – 1:00 PM	Films on solid substrates – Ellipsometry, spin coating, self assembled monolayers, Langmuir-Blodgett films. Contact angle measurements. Wetting and dewetting behavior. Adsorption isotherms
22	Dr. Kavitha Pandey	02/12/2020 Wed 3:00 PM – 4:00 PM	Optical Excitation in Semiconductor: Optical absorption, carrier generation, Carrier life time, diffusion length and photo conductivity, Diffusion of carriers, Einstein relation, Continuity equation, Carrier injection, Diffusion length.
23	Dr. S Krishna Prasad	04/12/2020 Fri 12:00 noon – 1:00 PM	Applications of liquid crystals
24	Prof. G U Kulkarni		Quantum confinement and Surface effects in nanosystems, Size-dependent properties-optical, electronic, magnetic and reactivity – I
25	Prof. G U Kulkarni		Quantum confinement and Surface effects in nanosystems, Size-dependent properties-optical, electronic, magnetic and reactivity – II
26	All Faculty	18/12/2020 11 AM – 1:00 PM	Student Seminar