Nano - Soft Course Schedule: Classroom

Sl. No.	Date Day	Instructor	Topics	Time
NS1	17.01.2020 Fri	Prof. G. U. Kulkarni	Concepts and Definitions: nanoscale processes, nanosystems, important nanomaterials, historical account	11.00 AM – 12 Noon
NS2	22.01.2020 Wed	Prof. G. U. Kulkarni	Quantum confinement and Surface effects in nanosystems, Size-dependent properties- optical, electronic, magnetic and reactivity – I	02.30 PM – 03.30 PM
NS3	29.01.2020 Wed	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	02.30 PM – 03.30 PM
NS4	31.01.2020 Fri	Dr. S. Krishna Prasad	Order parameters for different liquid crystalline phases and their experimental determination, Critical phenomena	11.00 AM – 12 Noon
NS5	05.02.2020 Wed	Dr. D. S. Shankar Rao	Diffraction of X-rays by liquids and liquid crystals, Information obtained from X-ray studies on liquid crystalline materials. Comparison between 2-D and 3-D crystallography	02.30 PM – 03.30 PM
NS6	07.02.2020 Fri	Dr. Geetha G. Nair	Rheology of gels and liquid crystals	11.00 AM – 12 Noon
NS7	12.02.2020 Wed	Prof. K.S. Krishnamurthy	Liquid crystals: Optical, electrical and magnetic properties	02.30 PM – 03.30 PM
NS8	14.02.2020 Fri	Dr. S. Angappane	Thin films: metal, semiconductor and organic films	11.00 AM – 12 Noon
NS9	19.02.2020 Wed	Dr. S. Angappane	Deposition techniques and thickness monitoring, growth modes, heterostructures	02.30 PM – 03.30 PM
NS10	21.02.2020 Fri	Dr. S. Angappane	Nanolithography- concepts and methods: optical-, electron-, ion- beam lithography, micromolding, nanoimprint lithography, clean room practices	11.00 AM – 12 Noon
NS11	26.02.2020 Wed	Dr. S. Krishna Prasad	Applications of liquid crystals	2.30 PM – 3.30 PM
NS12	28.02.2020 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	11.00 AM – 12 Noon

NS13	04.03.2020 Wed	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	2.30 PM – 3.30 PM
NS14	06.03.2020 Fri	Dr. H.S.S.R. Matte	Carbon nanomaterials: fullerenes, nanotubes and graphene; analogues and hybrids - I	11.00 AM – 12 Noon
NS15	11.03.2020 Wed	Dr. Veena Prasad	Chemistry of conventional and unconventional low molar mass liquid crystals	2.30 PM – 3.30 PM
NS16	13.03.2020 Fri	Dr. Neena S. John	Synthesis: top-down and bottom-up, hybrid methods	11.00 AM – 12 Noon
NS17	18.03.2020 Wed	Dr. C. V. Yelamaggad	Basic molecular structural needs for materials exhibiting mesomorphism, Driving forces for liquid crystal phase formation, Influence of Optical Activity, Monomers, Oligomers and Polymers	2.30 PM – 3.30 PM
NS18	20.03.2020 Fri	Dr. Pralay K. Santra	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	11.00 AM – 12 Noon
NS19	27.03.2020 Fri	Prof. K. A. Suresh	Surface and interfaces, surface tension, spreading of a liquid on another liquid, criteria for spreading. Liquid-liquid demixing, phase separation, spinodal decomposition	11.00 AM – 12 Noon
NS20	01.04.2020 Wed	Prof. K. A. Suresh	Microscopy of solid surfaces, optical microscopy, scanning probe microscopy. Surfactants, microemulsions, foam structure and foam stability	2.30 PM – 3.30 PM
NS21	03.04.2020 Fri	Dr. Pralay K. Santra	Photovoltaics – working principle. Different types of solar cells and their working mechanism	11.00 AM – 12 Noon
NS22	08.04.2020 Wed	Prof. G. U. Kulkarni	Quantum confinement and Surface effects in nanosystems, Size-dependent properties-optical, electronic, magnetic and reactivity – II	2.30 PM – 3.30 PM
NS23	15.04.2020 Wed	Dr. H. S. S. R. Matte	Carbon nanomaterials: fullerenes, nanotubes and graphene; analogues and hybrids – II	2.30 PM – 3.30 PM

Lab Work (2.00 PM -5.30 PM) on Mondays

Sl. No.	Date	Instructor	Topics
NSE1	03.02.2020	Prof. G. U. Kulkarni	Elucidation of the Nanoscale
NSE2	10.02.2020	Dr. S. Krishna Prasad	Permittivity measurements, influence of anisotropy, Dielectric spectroscopy
NSE3	17.02.2020	Dr. Pralay K. Santra	Synthesis of quantum dots, UV-VIS absorption spectroscopy, determination of band gap and size of quantum dot from absorption spectra
NSE4	24.02.2020	Dr. D. S. Shankar Rao	Xray Diffraction from layered and columnar structures, importance of 2D crystallography
NSE5	02.03.2020	Dr. Neena S. John	Atomic Force Microscopy
NSE6	09.03.2020	Prof. K.S. Krishnamurthy	Nematics: Temperature variation of birefringence, the Freedericksz transition and determination of elastic constants
NSE7	16.03.2020	Dr. Geetha G. Nair	Shear flow behaviour of Newtonian and Non-Newtonian fluids
NSE8	23.03.2020	Dr. S. Angappane	XRD for nanoparticles and films
NSE9	30.03.2020	Prof. K. A. Suresh	Determination of the ellipsometric angles delta and psi; (relative phase difference and amplitude change) for a birefringent film and estimating its thickness using one-zone method.
NSE10	13.04.2020	Dr. C. V. Yelamaggad	Synthesis of 4-n-alkoxybenzoic acids and Schiff bases
NSE11	20.04.2020	Dr. H. S. S. R. Matte	Raman: CNT and graphene
NSE12	27.04.2020	Dr. P. Viswanath	Surface manometry studies on a fatty acid monolayer at the air-water interface
NSE13	04.05.2020	Dr. S. Angappane	Scanning Electron Microscopy
NSE14	11.05.2020	Dr. Veena Prasad	(a) Cleaning and drying the laboratory glassware (b) Purification of LC compounds by recrystallisation technique