



**Course code: CeNS-IA      Instrumental methods & analysis – 2019**  
**Course Schedule**

**Venue: Lecture Hall**

<b>Sl. No</b>	<b>Date and Time</b>	<b>Topic</b>	<b>Instructor</b>	<b>Hrs</b>	<b>Ref</b>
1	<b>06 Sep (Fri)</b> 11:00 -12:00	<i>Electricity: types of connections, sockets, measurements</i>	D S Shankar Rao	1	-
2	<b>09 Sep (Mon)</b> 11:00 -12:00	<i>Basic electronics; Signals and noise</i>	P Viswanath	1	1
3	<b>11 Sep (Wed)</b> 11:00 -12:00	<i>Data collection, Analysis; Error Analysis</i>	P Viswanath	1	2
4	<b>13 Sep (Fri)</b> 11:00 -12:00	<i>Spectroscopic techniques: Fourier Transform techniques Photoluminescence Spectroscopy</i>	S Angappane	1	3
5	<b>16 Sep (Mon)</b> 11:00 -12:00	<i>Absorption spectroscopy: UV -Vis and FT-IR</i>	C V Yelamaggad	1	4
6	<b>18 Sep (Wed)</b> 11:00-12:00	<i>Photoelectron spectroscopy: XPS/ESCA, UPS and Auger techniques</i>	Pralay K Santra	1	5
7	<b>20 Sep (Fri)</b> 11:00-12:00	<i>Thermal analysis: Control and measuring temperatures, ThermoGravimetric Analysis, Differential Thermal Analysis</i>	S Krishna Prasad	1	6
8	<b>23 Sep (Mon)</b> 11:00-12:00	<i>Differential Scanning Calorimetry</i>	S Krishna Prasad	1	6
9	<b>25 Sep (Wed)</b> 11:00 -12:30	<i>X-ray and Nuclear methods: Diffraction techniques, X-ray absorption, Fluorescence and Small Angle Scattering</i>	K A Suresh	1.5	7
10	<b>27 Sep (Fri)</b> 11:00 -12:30	<i>Mass spectrometry: MALDI</i>	C V Yelamaggad	1	-
11	<b>30 Sep (Mon)</b> 11:00 -12:00	<i>Vacuum techniques</i>	S Angappane	1	-
12	<b>04 Oct (Fri)</b> 11:00 -12:30	<i>Resonance spectroscopy: NMR</i>	C V Yelamaggad	1	4
13	<b>11 Oct (Fri)</b> 11:00 -12:00	<i>Optical microscopy: Confocal microscopy</i>	K S Krishnamurthy	1	8
14	<b>14 Oct (Mon)</b> 11:00 -12:00	<i>Contact angle measurement</i>	P Viswanath	1	9
15	<b>18 Oct (Fri)</b> 11:00 -12:00	<i>Electric and Magnetic measurement techniques</i>	S Angappane	1	10
16	12:00 -13:00	<i>Ferroelectric measurement techniques</i>	D S Shankar Rao	1	-
17	<b>25 Oct (Fri)</b> 11:00-12:30	<i>Electron microscopy and Probe microscopy: SEM, FESEM, TEM, AFM</i>	K A Suresh	1.5	-
18	<b>01 Nov (Fri)</b> 11:00-12:00	<i>X-ray synchrotron methods</i>	Pralay K Santra	1	-
19	<b>04 Nov (Mon)</b> 11:00-12:00	<i>Rheometry</i>	Geetha G Nair	1	11
20	<b>08 Nov (Fri)</b> 11:00-12:00	<i>Raman spectroscopy</i>	H S S Ramakrishna Matte	1	12
21	<b>11 Nov (Mon)</b> 11:00-12:00	<i>3D Printing</i>	Ashutosh K Singh	1	-

## References:

- (a) The art of electronics, Paul Horowitz and Winfield Hill, 2nd Edition, Cambridge Univ Press.
  - (b) Principles of Instrumental Analysis, D A Skoog, F J Holler, and T A Nieman, 5th Edition, Harcourt Asia PTE Ltd.
- (a) An Introduction to Error Analysis: The Study of Uncertainties in Physics Measurements, J.R. Taylor, 2nd ed., University Science Books, 1997.
  - (b) Data Reduction and Error Analysis for the Physical Sciences, P.R. Bevington, D.H. Robinson, 3rd ed., McGraw Hill 2003.
- The Fourier Transform and its Applications, R. N. Bracewell, 3rd edn. New York: McGraw-Hill. (2000)
- (a) Organic Spectroscopy, William Kemp, Macmillan.
  - (b) Spectrometric identification of organic compounds, R. M. Silverstein, G. C. Bassler, and T. C. Morrill, (Wiley, New York).
- An Introduction to Surface Analysis by XPS and AES, John F. Watts, John Wolstenholme, John Wiley and sons, 2003
- Principles and Applications of Thermal Analysis, Paul Gabbott (Editor), April 2008, Wiley-Blackwell.
- (a) Elements of X ray diffraction (3rd edition), B.D.Cullity and S.R. Stock, Addison -Wesley Publishing company, 1978.
  - (b) X ray diffraction in crystals, imperfect crystals and amorphous bodies, Andre Guinier, Dover Publications.
  - (c) The basic concepts of X ray diffraction, E.Zolotoyabko (Israel)
- (a) Crystals and the Polarising Microscope, N. H. Hartshorne and I. A. Stuart, 3 Edn., Arnold, London, 1960.
  - (b) Optical Microscopy of Soft Matter Systems, Taewoo Lee<sup>1</sup>, Bohdan Senyuk<sup>1</sup>, Rahul P. Trivedi<sup>1</sup>, and Ivan I. Smalyukh, <http://arxiv.org/ftp/arxiv/papers/1108/1108.3287.pdf>
- Wetting of Real Surfaces, E. Bormashenko, De Grutyer (2013), ISBN 978-3-11-025879-0
- (a) Principles of Electrical Measurements, Slawomir Tumanski, CRC Press, 2006.
  - (b) Introduction to Magnetic Materials, B. D. Cullity, C. D. Graham, Wiley, 2009.
  - (c) Introduction to Solid State Physics, Charles Kittel; Solid State Physics, A.J. Dekker..
- (a) An Introduction to Rheology, Howard A. Barnes, John Fletcher Hutton, Kenneth Walters, Elsevier, 1989.
  - (b) Rheology: Principles, Measurements, and Applications, Christopher W. Macosko, Wiley-VCH, 1994.
- Introductory Raman Microscopy, J. Ferraro, K. Nakamoto, C.Brown, Academic Press, 2<sup>nd</sup> Ed., USA, 2003.