

Winter School on Biomedical Optics



(WISBO '23)

11 - 15 December, 2023,

IIITDM Kancheepuram-Chennai



Department of Electronics and Communication Engineering, IIITDM Kancheepuram

Biomedical optics has become one of the most inevitable field in the recent research in clinical diagnosis and treatment. In this course, we will learn about the fundamentals of biomedical optics, starting from how the photon interacts with a single atom, to a diatomic species, and then with polyatomic species such as haemoglobin. You will learn the basics of spectroscopy and different imaging modalities such as fluorescence, UV-Vis-NIR, diffuse optics, polarization, Speckle contrast, and multimodal imaging. You will also learn about fundamental and advances in the field of optical biosensors and various plasmonic resonances. We will also discuss the principles and details along with demonstration of various microscopic imaging such as brightfield, phase contrast, fluorescence and polarization-based microscopy.

School website: www.wisbo.in

Venue: IIITDM Kancheepuram-Chennai

Schedule: 11th Dec, 2023 to 15th Dec, 2023

Fees: ₹1500 for Students (UG/PG/PhD), ₹2500 for Faculty & Industry. The prices are inclusive of GST. (The registration fees covers lunch throughout five days of the school)

Registration link: <https://bit.ly/463S4na>

Last date for registration: 18th November, 2023

Who Can Apply?: Regular UG (B.E/B.Tech) students, PG-level (MTech/M.E./M.Sc) students, Ph.D scholar pursuing their degree from University / Institution within India, Faculty, and industry members in relevant fields.

Accommodation: The in-campus accommodation can be provided based on the availability in the hostel. Please visit the School Website to know more about accomodation.

Thrust Areas:

1. Tissue optics & Optical Fiber Sensing: Fundamentals, radiative transfer functions, monte-carlo techniques, and tissue polarimetric, and optical fiber sensing techniques
2. Spectroscopy Methods in Life Science: Basics of spectroscopy methods, Vis-NIR-MIR spectroscopy, Raman spectroscopy, and Fluorescence spectroscopy.
3. Tissue Imaging and Processing: Diffuse Optical Imaging, Laser Speckle Imaging, Fluorescence, Optical Coherence Tomography, Photoacoustic Imaging, Medical Image Processing, key feature extraction, and Artificial Intelligence (AI) in Imaging.
4. Microscopic Imaging: Principles of microscopic imaging, polarization-based microscopy, Phase contrast and Fluorescence microscopy, and nanoscopy.
5. Optical Biosensors & Artificial Intelligence: Fundamental of Optical Biosensor: Plasmonics, Raman scattering, Plasmonics, SPR, LSPR, SPP, Raman spectroscopy, SERS, SORS. Introduction to Artificial Intelligence (AI) in Medical Imaging.

About IIITDM Kancheepuram:

IIITDM Kancheepuram is an Institute of National Importance established by the Ministry of Education, Government of India to pursue design and manufacturing-oriented engineering education and research and to promote the competitive advantage of Indian products in global markets. The Institute offers B Tech, M Tech and M Des programmes and PhD programmes in Computer Science and Engineering, Electronics and Communication Engineering, Mechanical Engineering, Interdisciplinary Product Design, Mathematics, Physics and English.

Schedule

Slot	Time	Day 1 (Tissue Optics: TO)	Day 2 (Spectroscopy: SP)	Day 3 (Tissue Imaging and Image Processing: TIIP)	Day 4 (Microscopy: MI)	Day 5 (Optical Biosensors & Artificial Intelligence: OB & AI)
1	09-10.30 (Basics)	(TO1) (Theory) Tissue Optics (Advanced) [Prof. Sujatha N.]	(SP 1) (SP 1) (Theory) Spectroscopy Methods in Life Sciences I (Basics) [Prof. Tapas Sil]	(TIIP 1) (Theory) Tissue Imaging II (Basics)	(MI 1) Microscopic Imaging I [Dr. Monisha M.]	(OB 1) (Theory) Optical Biosensors I (Basics) [Dr. Gowri A.]
Break						
2	11:00 - 12:30 (Advanced)	(TO2) (Theory) Tissue Optics (Advanced) [Prof. Sujatha N.]	(SP 2) (Theory) Spectroscopy Methods in Life Sciences II (Advanced) [Dr. Vivek Kumar]	(TIIP 2) (Theory) Tissue Imaging II (Advanced)	(MI 2) Microscopic Imaging II [Dr. Sebastian Raza]	(OB 2) (Theory) Optical Biosensors II (Advanced) [Dr. Gowri A.]
Lunch Break						
3	1400 - 1530 (Hands-on session I)	(TO3) (Theory) Optical Fiber (Basics) [Dr. Srijith K.]	(SP 3) (Experimental) Calibrating a Spectrometer and acquisition of diffuse reflectance spectra. UV-Vis-NIR Spectrometer. [Mr. Jayakumar Sambasivan]	(TIIP 3) (Theory) Medical Image Processing	(MI 3) (Experimental) Bright field, phase contrast microscopy [Dr. Sebastian Raza]	(AI 1) (Simulation) Introduction to Artificial Intelligence in Medical Imaging [Dr. Priyanka Kokil]
Break						
4	1600 - 1730 (Hands-on session II)	(TO4) (Theory) Optical Fiber (Advanced) [Dr. Srijith K.]	(SP 4) (Experimental) Fluorescent spectrometer, Raman Spectrometer. [Mr. Jayakumar Sambasivan]	(TIIP 4) (Hands on Demonstration) Medical Image Processing	(MI 4) (Experimental) Fluorescence microscopy and nanoscopy [Dr. Sebastian Raza]	Concluding Remarks and Certificate Distribution

Speakers/Trainers

	Dr. Uttam M. Pal Assistant Professor Department of Electronics and Communication Engineering, IIITDM Kancheepuram - Chennai		Dr. Gowri A. Assistant Professor Department of Electronics and Communication Engineering, IIITDM Kancheepuram - Chennai
	Dr. Srijith K. Assistant Professor Department of Electronics and Communication Engineering, IIITDM Kancheepuram - Chennai		Dr. Priyanka Kokil Associate Professor Department of Electronics and Communications, IIITDM Kancheepuram
	Dr. N. Sujatha Professor Department of Applied Mechanics, IIT Madras		Dr. Arpitha Anantharaju, Associate Professor Department of Gynecology & Obstetrics, JIPMER Puducherry
	Dr. Rohini P. Assistant Professor Department of Electronics and Communication Engineering, IIITDM Kancheepuram - Chennai		Dr. Monisha M. Assistant Professor SIDI-School of Interdisciplinary Design and Innovation
	Dr. Tapas Sil Associate Professor, Department of Sciences and Humanities, IIITDM Kancheepuram Chennai		Dr. Sebastian Raja Applications Manager, DSS Imagetech India
	Dr. Vivek Kumar Assistant Professor, Department of Sciences and Humanities (Physics), IIITDM Kancheepuram - Chennai		Mr. Jayakumar Sambasivan Director, COMTEK Scientific Instruments

Facilitators:



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