

PHOTONICS INTERDISCIPLINARY PROGRAMME (IITK)

(CENTRE FOR LASER TECHNOLOGY IIT KANPUR)

PLACEMENT BROCHURE

2012-13

From the Desk of FPC

It provides me a great pleasure to bring out this placement brochure from this unique interdisciplinary effort from one of the oldest interdisciplinary programs in the country. The M.Tech program in Laser Technology (LT) at IIT Kanpur Center for Laser Technology was setup with the unique aim of training the top interested technical graduates into the diverse area of Laser applications and we are very proud to have produced some of the best problem solving capable students in the process. This being an overtly selective program from the point of induction to the point of their graduation, none of our Alumni have suffered till date in terms of their placement even during the toughest of the recession times. They have been dually prepared both for higher education, research or industrial aptitude. As a result, alumni from our program are present across the globe in both industry and academics. This year on the occasion of Golden Jubilee of laser innovation there will be one day laser symposium which will show our academic-industrial relation. To smoothen the placement process, we ensure that our students are well-aware of the needs of the companies and are available to interact with them along with a thorough analysis of their own specialized skills. This way we ensure that the recruitment process is most effective and yet possible with minimum effort and time on your end. We believe that our students are our ambassadors and we look forward to a sustained relationship with you. It will be our honour to see our students enriching your organizations.

Prof. Utpal Das
Faculty Placement Coordinator (LTP)
Email: utpal@iitk.ac.in

Center for Laser Technology @IITK

CELT offering M.Tech in Engineering programme acts as a nodal point for Photonics and Optical Communication related research at IIT Kanpur.

This being an interdisciplinary engineering program unites knowledge from both engineering and science specialization and emphasises on Photonic Science and Engineering based research creating new horizons in this field. The current interests are in the fields of **Optoelectronics, Optical Communication, Fiber Optic Systems, Biomedical Applications (Biophotonics), Imaging & Ranging and Quantum Optics** based applications. Research on Semiconductor lasers and Receivers, Semiconductor fabrication, Secure communication, Quantum cryptography, OFDM based communication, Fibre lasers, Particle Imaging, LiDar systems, Vein Imaging, Cancerous cell detection, Photonic Crystals are some of the topics being currently pursued by the students.

Students Exposure

The students of this stream are all from engineering background mainly being from Electronics and Communication Engineering contributes to the R&D fields of fiber optics and photonics .

Through multiple course work and internships students develop skills in both simulation based modeling and experimentation. Students of this particular stream has knowledge of programming and modeling skills on the platforms like - **Lab-View, MATLAB, Simulink, Meep, Model based C Programming** Adding to their skills acquired in under graduate level like C programming, HTML programming VHDL programming etc.

Students worked in internships at different CSIR ([Council of Scientific and Industrial Research](#)) labs like Fiber Optics and Photonics Division at Central Glass and Ceramic Research Institute (CGCRI) & Central Electronics Engineering Research Institute (CEERI) for internships and testing and measurement based works.

COURSE STRUCTURE FOR M.TECH. (LASER TECHNOLOGY)

Semester 1

- Introduction to Lasers
- Introduction to Coherent and Laser Optics
- Fiber Optics Systems
- Open Elective One

Semester 3

- M.Tech. Thesis

Semester 2

- Laser Applications
- Lab Techniques
- Open Elective One
- M.Tech. Thesis

Semester 4

- M.Tech. Thesis

List of Elective Courses Taken by Our Students

1. Optical Communication
2. Digital communication Networks
3. Fiber Optic systems I, II
4. Digital Switching
5. Photonic Networks & Switching
6. Microwave Measurements
7. Introduction to Virtual Instrumentation
8. Electronics
9. Quantum Electronics
10. Intelligent Instrumentation
11. Video and Image Processing
12. Semiconductor Lasers and Optoelectronics
13. Integrated Circuit Technology
14. Semiconductor Device Modelling
15. High Frequency Semiconductor Devices & Circuits
16. Fourier Optics & Optical Information Processing
17. Nonlinear Fiber Optics
18. Advanced Engineering Electromagnetics

SOME COMPLETED AND ONGOING THESIS WORK @Laser Technology

- IR Imaging through fog using Laser Scanner
- Fiber Lasers/amplifiers for DWDM/UDWDM communication
- Mode locked fiber laser for ultra short pulse generation
- Chaos in secure optical communication
- Supercontinuum generation in Photonic Crystal Fibers
- OFDM and subcarrier multiplexing
- LiDar ranging and imaging
- Optical tomography and lock in thermography based solar cell defect detection
- Bidirectional pumped four-wave mixing for entangled photons generation
- Decoy-state protocol for subcarrier multiplexed frequency-coded quantum key distribution
- Ultrafast fast laser pulse shaping
- Design and analysis of WDM/TDM based photonic packet switching node architecture

RESEARCH @LASER TECHNOLOGY

Quantum Optics

- Quantum Entanglement and Squeezing
- Quantum Key Distribution
- Quantum Computation
- Coherent Control

Optical Communication

- Fiber Optics
- Fiber Optic Networks
- Nonlinear Optics
- Fiber Lasers
- Supercontinuum Generation

Photonic Integration

- Opto-Electronics
- Semiconductor Devices and Lasers
- Metamaterials

Optical Imaging

- Interferometric Tomography
- Particle Image Velocimetry
- Laser Schlieren
- Laser Ranging and LiDAR
- Imaging Growth of Protein Crystals
- Digital Holography
- Multiphoton Imaging

Biophotonics

- Medical Applications Of Lasers
- Spectroscopy and Imaging in complex systems

Researchs associated with Different Laboratories

1. Optoelectronics Laboratory

Semiconductor Lasers, Semiconductor Fabrication, Photodiode Array Receivers, IR imaging

2. Photonics Laboratory

Non-Linear Fiber Optics, Secure Comm., Fiber Lasers.

3. Fiber Optics Laboratory

WDM, OFDM, Quantum Cryptography, Entangled photon pair generation

4. Ultrafast Femtosecond Lab

Ultrafast Pulse Shaping for Ultrafast Communication

5. Optical Imaging Laboratory

Imaging of Veins, 2D photonic crystals

6. Biophotonics Laboratory

Cancerous cell detection by cell imaging by Interferometric & tomographic imaging techniques.

7. Imaging and Holography Laboratory

Nonlinear optics , Coherent control of light-matter interaction , Quantum optics
Metamaterials , Imaging in random media , Geometric phase based devices

Resources @Laser Technology

- | | |
|--|---|
| <ol style="list-style-type: none">1. MJB3 Mask Aligner (I-line, 3inch substrates)2. Baking Oven (1100 Deg. C)3. Ziess Microscope (50X obj)4. Photoresist Spinner (4800rpm)5. Optical surface profiler (vertical 0.01nm, Horizontal 2.5micron)6. Reactive Ion Etch System (Methane Chemistry)7. E-Beam evaporator (turbopump driven, 6kW, 4pocket, 6cc)8. Optical Bench and Optical waveguiding setup9. Micro-Raman Facility10. Beam Chamber | <ol style="list-style-type: none">11. CCD Camera12. Data acquisition cards and systems13. Laser Scanner14. High Speed BW Camera15. Inverted microscope16. BW Camera17. Mach-Zhander Interferometer18. Tunable laser (1270-1650nm)19. Particle Image Velocimetry20. Fluorescence setup21. Color Camera22. Time delay and synchronizing circuits |
|--|---|

FACULTY @LASER TECHNOLOGY PROGRAMME

- Dr . Utpal Das (Ph.D, Michigan)
- Dr . Pradeep Kumar(Ph.D, IITM)
- Dr . R Vijaya (Ph.D, IITM)
- Dr . Debabrata Goswami (Ph.D, Princeton)
- Dr . Asima Pradhan (Ph.D, City University, New York)
- Dr . Pradipta K. Panigrahi (Ph.D, LSU)(Head,CELT)
- Dr . HarshwardhanWanare (Ph.D, University of Hyderabad)
- Dr . K. Muralidhar (Ph.D, Delaware)(Dean R&D,IITK)
- Dr . D.P. Mishra (Ph.D, IISc Bangalore)
- Dr . Bharat Lonhani (Ph.D, ESSC, The University of Reading, UK)
- Dr . Sudhir Kamle

PREVIOUS RECRUITERS IN CELT

Students of CELT are working across the globe. Few organizations that have been and are being served are :

TEXAS INSTRUMENTS	DRDO
TEJAS NETWORK	BEL
BIG TEC LAB	MATHWORKS INDIA
INTEL	NIKSUN
SASKEN COMMUNICATIONS	CDOT
NIKSUN	MECON
SAHAJANAND TECHNOLOGIES	CIENA INDIA PVT. LTD.
SAMSUNG INDIA	ISRO
TATA STEEL	DELOITTE
TCS	BHEL
INDIAN RAILWAYS	FINISAR

CONTACT US

VISIT US AT: www.iitk.ac.in/celt

FPC: Dr. Utpal Das
Professor , Department of EE Engineering and Laser
Technology
utpal@iitk.ac.in
512-2597150 (O), 0512-2597360 (L)

DPC: Anandan Mukund
amukund@iitk.ac.in
8052448586