INTRODUCTION TO PHOTONICS

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ELECTRICAL ENGINEERING

TYPE OF COURSE : New | Elective | UG/PG
INTENDED AUDIENCE : Third or Final year BE/BTech,
                      First year ME/MTech/MS/PhD
PRE-REQUISITES : Basic knowledge in Electromagnetics is preferred

COURSE OUTLINE :
Introductory course in photonics leading to more advanced courses such as Lasers, Optical Communications, Optical Sensors and Photonics Integrated Circuits. The learning objectives are: (1) Learn the fundamental principles of photonics and light-matter interactions, (2) Develop the ability to formulate problems related to photonic structures/processes and analyze them, and (3) Understand processes that help to manipulate the fundamental properties of light.

ABOUT INSTRUCTOR :
Dr. Balaji Srinivasan obtained his Ph.D. in 2000 from the University of New Mexico, USA. He subsequently worked as a Senior Development Scientist at Corning Incorporated, USA, where he led technology development efforts related to 3D Optical Cross-connects and Channel Selectable Tunable Filters. Since 2004 he has been with the Indian Institute of Technology Madras as a faculty in the Department of Electrical Engineering, presently as Professor. Prof. Balaji’s research interests span the development of active and passive optical components / subsystems for fiber lasers and distributed fiber optic sensors. He has co-authored more than 130 journal and international conference publications. He also has seven patents to his credit.

COURSE PLAN :
- Week 01 : Wave/particle duality; What are photons?
- Week 02 : Statistical properties of light, Coherence
- Week 03 : Photon properties - energy, flux, statistics
- Week 04 : Interaction of photons with atoms
- Week 05 : Light amplification
- Week 06 : Laser Fundamentals
- Week 07 : Semiconductor Junction devices
- Week 08 : Semiconductor light sources
- Week 09 : Semiconductor light detectors
- Week 10 : Interaction of light with RF and acoustic waves
- Week 11 : Nonlinear behavior of materials
- Week 12 : Photonic systems - Examples

EXAM DATE : 27 April 2019

INDUSTRIES APPLICABLE TO : Sterlite Technologies, NeST Photonics, Tejas Networks, Vinvish Technologies, BEL, CGCRI, RRCAT, DRDO – LASTEC/IRDE/CHESS