IMPORTANCE AND SCOPE

Current research on microwave techniques and applications increasingly focus on novel and engineered materials to fulfill the stringent needs of modern communication. In this respect, metamaterials have played a significant and dominant role in size reduction and performance enhancement of microwave devices including both antennas and guided wave components.

Though the concept of opposing phase and group velocities in a periodic structure has been known to the microwave community, the application of the technology to the design of novel microwave devices has been relatively recent. In one domain, metamaterials have enabled us to very significantly enhance the extent of miniaturization of microwave antennas while maintaining or exceeding their efficiency to close to the physically attainable 'Chu Limit'. The course would focus on the techniques and concepts behind the significant size-reduction of such antennas for planar and non-planar structures.

In addition, metamaterial-based designs have been used for the directivity enhancement of antennas using the mu-near-zero or epsilon-very-large effects. The magnetic resonator behavior under parallel incidence condition can be utilized to realize the enhanced gain characteristic. However, from the perspective of miniaturized antenna with reduced superstrate height, the normal incidence condition is more attractive. Unit cells exhibiting electric resonance are particularly useful to achieve this goal. The course would as such focus on the design and characterization of such metamaterial topologies leading to the development of efficient directive antennas.

Metamaterial-based structures have also been used to overcome traditional limitations of microwave structures like inadequate broadside performance of leaky wave antennas or to mitigate enhanced mutual coupling effects with reduction in element spacing in antenna arrays. In addition, design of metamaterial-loaded guided wave structures with reduced wave interaction at higher frequencies would also be addressed. The course would also focus on the development of efficient radar absorbing materials with reduced thickness, high absorption and wider sensitivity to a large range of incident angles.

KEY TOPICS TO BE ADDRESSED

- Basic electromagnetic theory
- Metamaterial design and analysis
- Miniaturized metamaterial antennas
- Gain enhanced metamaterial antennas
- Leaky wave metamaterial antennas
- Metamaterial Cloaks
- Dielectric resonator antennas
- Guided wave structures with metamaterials
- Radar absorbing materials based on metamaterials
- EMI / EMC
- Microwave components

SPEAKERS

Faculty / domain experts from IIT, Kharagpur

Course Schedule

10 am to 2 pm each day except Saturday and Sunday. Fully online mode.

Online Short term course on "Design and Applications of Metamaterials"

June 19- 30, 2023

A Continuing Education Programme of Indian Institute of Technology Kharagpur

Prof. Bratin Ghosh

Organized by

Department of Electronics and Electrical Communication Engineering
Indian Institute of Technology
Kharagpur – 721 302, India

COURSE COORDINATOR

Prof. Bratin Ghosh

Mailing address:
Prof. Bratin Ghosh
Department of Electronics & Electrical Communication Engineering,
Indian Institute of Technology,
Kharagpur-721302,
West Bengal
Email : bghosh@ece.iitkgp.ac.in,
pandaarabinda@gmail.com
Phone : +91-3222-283534
Mobile No. +91-9831064495/9635171122
Fax: +91-3222-255303

Eligibility for Participation
Teachers from Colleges / Institutions / Universities. Scientific Officers / Instructors / Technical Assistants /Research Scholars/Under Graduate and Post Graduate Students/ Participants from Industries.

How to apply

The course fee can be paid online through IIT Kharagpurweb-portal by following the steps given below (candidates applying in a group can however pay their fees offline through demand draft drawn in favour of **'CEP-STC, IIT Kharagpur'**, payable at **Kharagpur.**)

How to apply

Usethelink:**https://erp.iitkgp.ac.in/CEP/courses.htm**toa pplyONLINE.

Payment if applicable is to be done **ONLINE** after being shortlisted for the program.

Course fee:

- For Students: Rs.8,000/- (including application fees & all taxes)
- For Industry: Rs. 16,000/- (including application fees & all taxes)
- For Teachers/Others: Rs. 12,000/- (including application fees & all taxes)

(Application fees are non-refundable and non-transferable under any circumstances)

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Important dates :
Last date for receiving application: June 1, 2023