



Indian Institute of Technology Kanpur

INTRODUCTION

An intensive course on Fundamentals and Applications of Metamaterials, from microwave to optical frequency range, will be conducted between 19 and 23 August 2019, sponsored by the Continuing Education Program of IIT Kanpur. The program will be specifically useful for persons who are concerned with Microwave, Infrared and Optical properties of **Metamaterials** in Research and Industry as well as training/teaching of students/ personnel. Through this program, IIT Kanpur's internationally recognized expertise in this area is being used to create pool of appropriately trained technical personnel in India. The course is designed to cater to the needs of teachers from Science & Engineering Institutions, scientists from R & D labs and practicing engineers from industry. It aims to equip the participants with an essential knowledge of the area so as to enable them start working with metamaterials in their research & applications.

OBJECTIVES

Metamaterials have captured the public imagination due to the exceptionally attractive applications that were claimed for them, such as perfect lenses, invisibility cloaks, perfect absorbers, miniaturized antennas and waveguides with enhanced performance etc. After intense research in the last decade, the field of metamaterials has now become quite mature and several applications are now coming out of these. In the Indian context, Reasonable number of engineers from Science and Engineering Colleges, NITs etc. are now getting into this area. Government units such as ISRO and DRDO have recently begun several programmes towards the development of strategic applications involving metamaterials. The industry, however, has lagged behind in the use of metamaterials. In this course, emphasis will be placed on understanding the basic physical principles and developing applications. The course will give an exposure to the computational design and simulations of metamaterials. The primary objective of imparting working knowledge in the

above mentioned areas will be achieved through lectures, tutorials and problem solving sessions, demonstrations of computer simulations and laboratory visits.

COURSE CONTENTS

Lectures and tutorials will be delivered by experts working at IIT Kanpur and other reputed institutions on:

- Introduction to Metamaterials
- Homogenization of Structured Materials
- Modeling of Electromagnetic/Photonic Structures using Computer Simulations
- Metamaterial Microwave Antennas and Absorbers
- Infra-red and Optical Metamaterials
- Electromagnetic Cloaking by Metamaterials
- Photonic Bandgap Materials
- Nanostructured Plasmonic Surfaces
- Micro and Nanofabrication Techniques
- Microwave, IR and optical Characterization Techniques

COURSE FEE

UNIVERSITY / ACADEMIC INSTITUTIONS

There is no course fee for engineering/science teachers from Universities / AICTE / UGC recognised Colleges / Academic Institutions. Participants will be paid to and fro train fare (AC 3-Tier) via the shortest route (strictly upon production of the ticket) as well as free boarding and lodging in the guest house/hostels at IIT Kanpur. The course application forms should reach to course coordinators latest by **15th June 2019**. The Participants are required to get their applications duly recommended by the Head of the Institution/Department. The teachers should have M.E./M.Tech./M.Sc. degrees in Electronics / Electrical / Photonics / Physics. Candidates with Ph.D. and/or UGC/CSIR Lecturership will be preferred. The selected candidates will be required to send a refundable caution deposit of Rs. 1000 to ensure their commitment for participation in the course. This amount will be refunded only to those candidates who attend the course (Do not send the demand Draft until you receive a confirmation of your selection by email).

NON-QIP CANDIDATES

Teachers not selected for QIP funding may choose to finance themselves to attend the course. Registration fees of Rs. 8000 + 18% GST (= Rs. 9440) will be payable.

Ph.D. Students working on metamaterials in Universities / AICTE recognised Colleges/Academic Institutions can be given

a chance to participate as a special case. A registration fees of Rs. 6000 + 18% GST (= Rs. 7080) will be payable.

Non-QIP participants will also have to bear their expenses on accommodation and food. Accommodation can be arranged in students' hostels or guesthouse on payment basis.

PARTICIPANTS FROM INDUSTRY/ R & D LABS

Private and public sector companies and other R & D organizations are welcome to depute their executives, managers, researchers and engineers to participate in course. The sponsoring organizations are required to pay a course fee of Rs. 12000 + 18% GST (= Rs. 14160). The participants will have to make their own arrangements for travel. Boarding and lodging can be arranged on payment basis in the guest house at IIT Kanpur based upon prior request and availability.

In all cases, the scanned registration form duly recommended should be sent first by email and the hardcopy should be sent by post.

The list of selected candidates will be displayed on the web-page (home.iitk.ac.in/~kvs/meta2019.htm)

MODE OF PAYMENT

The caution deposit for QIP candidates should be sent by cheque made payable to “**Coordinator, Continuing Education Programme, IIT Kanpur**”.

The registration fee for non-QIP and industry/R&D participants should be paid via SBI-collect. The details for online payment is given at:

<http://home.iitk.ac.in/~kvs/meta2019.htm>

IMPORTANT DATES

Receipt of Application: 15th June 2019

List of selected Candidates: 30th June 2019

Receipt of Fees / Caution Deposit: 15th July 2019

ADDRESS FOR CORRESPONDENCE

Course Email: meta2019.iitk@gmail.com

Course Website: <http://home.iitk.ac.in/~kvs/meta2019.htm>

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**Electromagnetic Metamaterials:
Microwave-Infrared-Optical Applications
19 - 23 August 2019
Indian Institute of Technology Kanpur**

Registration form is available at
<http://home.iitk.ac.in/~kvs/meta2019.htm>
and requires following information (not hand written)

Name: _____
 Position: _____
 Department: _____
 Institution/Organization: _____
 Address: _____

 Email: _____
 Mobile: _____

Educational Background (starting from UG):

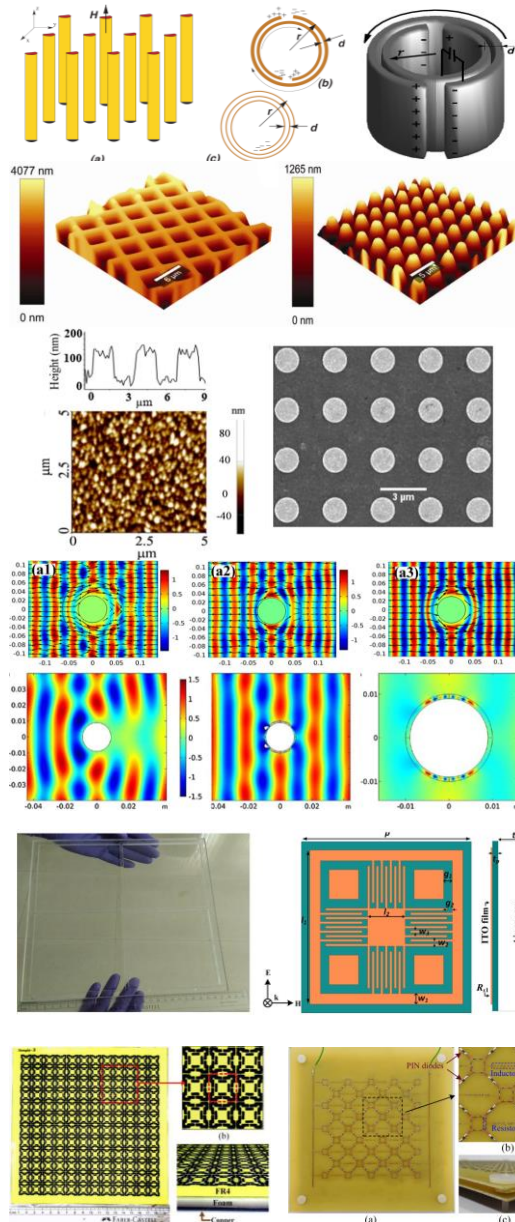
Degree	Specialization	Institute / University	% of Marks	Year of Passing
B.Tech. / B.E.				
M.Tech. / M.E. / M.Sc.				
M.Phil. / Ph.D.				

Area of Research: _____

Signature of Applicant: _____

Recommendation: _____

Signature of Head
(Department/Head of the Institution / Organization)



**Short course on
Electromagnetic Metamaterials:
Microwave-Infrared-Optical Applications
19 to 23 August 2019**

for teachers, practicing engineers and scientists

Sponsored by
All India Council for Technical Education, New Delhi
(Under the Continuing Education Program, IIT Kanpur)



**Coordinators
Prof. Kumar Vaibhav Srivastava
Prof. S. Anantha Ramakrishna**

Department of Electrical Engineering
&
Department of Physics



**INDIAN INSTITUTE OF TECHNOLOGY, KANPUR
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