

# Introduction to Principles of Green Chemistry

Under the aegis of MHRD—Global Initiative of Academic Networks

URL: <http://iiti.ac.in/GIAN/>

## Overview

India is one of the fastest growing economies in the world today. It is the second largest producer of pesticides, and one of the emerging markets for pharmaceuticals and petrochemicals. These growing industries have often led to environmental problems. Hence it is important that environmental education and practice keep pace with this growth. Although students receive good training in India on the principles of chemistry, the practice of green chemistry there is still in its infancy.<sup>1</sup> In this course students will be exposed to modern green chemistry principles that they can incorporate into their research and practice of chemistry. Even for students who may not pursue a career directly in a Chemistry related field, it is important to be aware of current issues pertaining to the environment. Awareness about environmental issues is the first step in finding solutions, which given the extent of the problem in India, needs to be multipronged.

As the Indian economy grows at an impressive rate, there are increasing concerns about the negative impact of this growth on the environment. Because of increasing environmental concerns, it is imperative that the coming generation of scientists in India be educated on the practice of green chemistry to prevent pollution and improve human health. Coming to India through the GIAN program will allow me to offer my expertise in solving a significant problem while providing tangible benefits to the host institutions. The practice of Green Chemistry is crucial to the protection of the environment across the globe and hence all countries stand to benefit by practice of green chemistry. While the practice of green chemistry in a laboratory by an individual chemist here and there is important, much more so is the impact of her/his work when incorporated into the daily practice of increasing number of professionals. The opportunity for me to increase exponentially the numbers of scientists using green principles by educating future teachers elsewhere in the world is compelling and, given the nature of the work itself, necessary. Given my expertise in the field, I can offer assistance to a wide audience in India

## Schedule of the Course

|                                      |                                         |
|--------------------------------------|-----------------------------------------|
| <b>Schedule of the course</b>        | : June 17 -24, 2016                     |
| <b>Total Number of days/lectures</b> | : 8 days / 10 lectures and 10 tutorials |

## Registration Fee

|                                        |              |
|----------------------------------------|--------------|
| <b>Participant from outside India</b>  | : USD 500    |
| <b>Industry/ Business organization</b> | : Rs. 20,000 |
| <b>Academic Institutions</b>           | : Rs. 5,000  |
| <b>Students</b>                        | : Rs. 2,000  |

The fee includes all instructional materials, computer use for tutorials, internet facility and lunch. The participants will be provided with accommodation on payment basis.

<sup>1</sup> Kidwai, M. Green Chemistry in India. *Pure Appl. Chem.* **2001**, 73, 1261.

## Topics Covered

Introduction to Green Chemistry, Fundamental concepts, Case studies to illustrate impact of green chemistry on society, Effects of green chemistry on environment and society, Renewable Resources as a source of organic chemicals and precious fuels, Catalysis, Solvents-Alternatives to petroleum based volatile organic compounds, Alternate Methods to Promote Organic Reactions, Green Chemistry in the Pharmaceutical Industry.

## Faculty Information



### Teaching Faculty

**The course will be delivered by Professor Ram Mohan, currently the Wendell and Loretta Hess Professor of Chemistry, at Illinois Wesleyan University.** Professor Mohan is an organic chemist whose research is devoted to the development of environmentally friendly organic synthesis using bismuth compounds. Green chemistry is at the heart of Professor Mohan's research program. Coming from a small undergraduate liberal arts school, Professor Mohan has considerable teaching experience and working with beginning students. Professor Mohan is an internationally renowned scholar in the field of green chemistry. He has considerable experience teaching and practicing green chemistry. In 2005-06 he spent his sabbatical at The Center for Green Chemistry at Monash University in Melbourne, Australia. More recently, he has spent a year in India as a Fulbright scholar. During this time he delivered a green chemistry course at IISER, Mohali. In addition he has offered a ten day lecture series on green chemistry at several Indian institutes which include (1) Guru Nanak Dev University, Amritsar (2) Lovely Professional University (3) Mysore University, Mysore (4) Northern Maharashtra University, Jalgaon (5) Saurashtra University, Rajkot and (5) Pondicherry University. He is currently visiting Pondicherry as a Fulbright Specialist on Green Chemistry. He also conducted a Green chemistry workshop for undergraduates at Raghu Engineering College in Visakhapatnam in October of 2015. Professor Mohan has also travelled extensively in India and visited numerous small undergraduate colleges (he does not charge the colleges for these visits) and given green chemistry lectures. These included a remote place in a tribal belt in Northern Maharashtra (Shahada College). He believes that it is important to reach students, not just in premier institutes but also in small, remote areas of India. Professor Mohan was also a consultant for Gargi College, a small undergraduate college in New Delhi. He helped Gargi College make significant strides in greening their undergraduate curriculum. Professor Mohan's contributions to green chemistry are internationally recognized. In June of 2016 he will be conducting a green chemistry workshop for over 100 students from Mainland China in Hong Kong University. His contributions to green chemistry and undergraduate education were recognized by a Pfizer Green Chemistry Award. Given his extensive teaching experience and unfailing commitment to green chemistry, Professor Mohan would be ideally suited for invitation to India as a GIAN faculty to inspire, educate and motivate Indian students.



#### Co-ordinating Faculty

**Dr. Chelvam Venkatesh**, an Organic Chemist and Chemical Biologist is an assistant professor in the Discipline of Chemistry and Centre for Biosciences and Biomedical Engineering at IIT Indore. His long term goal is to establish a centre of excellence in the field of bio-science especially for detection and treatment of cancer and inflammatory diseases at IIT Indore. He has more than 7 years experience in imaging and microscopic techniques from postdoctoral training at the Purdue University, USA. He was also a postdoctoral fellow in the laboratory of Prof. Hans-Ulrich Reissig at Freie University Berlin, Germany in 2006-2008, where he was awarded Alexander von Humboldt fellowship and worked on total synthesis of natural products for cancer. He has published 24 peer reviewed journal papers in highly reputed international journals and some of his outstanding discoveries were published in prominent journals such as *Nanomedicine*, *Journal of Nuclear Medicine*, *Journal of Cell Sciences*, *Journal of Medicinal Chemistry*, *Journal of Organic Chemistry*, *Organic Letters*, etc. His revolutionary work on diagnosis and therapeutic applications of cancer and inflammatory diseases are US patented, and currently in clinical trials. Moreover he had appeared in ABC news for developing technology for intra-operative guided surgery of ovarian cancer in patients.

#### Who should attend this course?

1. Executives, engineers and researchers from manufacturing, service and government organizations including R&D laboratories.
2. Undergraduates, M.Sc, and PhD science stream students. Any student with a basic chemistry background will be able to follow these lectures and gain a lot from them.
3. B.Sc and M.Sc level teachers who wish to update their green chemistry knowledge.

#### Course Co-ordinator

**For any further information and registration, please contact:**

**Dr. Chelvam Venkatesh**

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