

**Completed Registration form should be sent by regd. post to the following address:**

QIP Office, CE & QIP,

Attn. QIP Course: "Sustainable Engineering: Theory and Practice"

2<sup>nd</sup> Floor, Main Building

Indian Institute of Technology Bombay

Powai, Mumbai 400 076

Phone: (022) 25767006, 25767048

Fax: (022) 25726199

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### IMPORTANT DATES

**Deadline for submitting Application: Nov. 30<sup>th</sup>, 2017**

**Notification of Acceptance: Dec 2<sup>nd</sup>, 2017**

**Course Dates: December 11 – 15, 2017**

- For additional copies of the registration form, use a photocopy of this brochure. For further details, ref.

<http://www.qip.iitb.ac.in/qipcourse2017.php>

### VENUE FOR COURSE

Lectures will be in the Seminar Hall, Van Vihar Guest House, IIT Bombay.

### DATE & TIME FOR REGISTRATION

December 11, 2017, 0900 hr. at the venue.

### ELIGIBILITY

Faculty members of degree level or above colleges / institutes recognized by AICTE.

### COURSE EVALUATION

Successful participants will be awarded 'QIP Course Completion Certificate'.

### REGISTRATION

There is no registration fee for the QIP course. All registered candidates are required to confirm their participation by sending a Demand Draft of ₹ 1000/- in the name of "Registrar IIT Bombay". This amount will be refunded to the participant if s/he attends the

course. If a participant does not attend the course, this amount will be forfeited. Shortlisting and confirmation of eligible candidates will be on a first come first serve basis, up to a maximum of 60 candidates.

### TRANSPORT, BOARDING, & LODGING

Participants are entitled for II class (Sleeper Class) or III AC railway to and fro fare by the shortest route from their college / institute to IIT Bombay. All participants will be given auto rickshaw fare from Kanjurmarg / Andheri Rly. Station to IIT on the dates of arrival and departure. Local participants (from Mumbai, Navi Mumbai, or up to Karjat / Kasara / Khopoli) will be paid 2<sup>nd</sup> class railway fare or BEST Bus fare.

Boarding and lodging will also be provided free of cost. Accommodation will be provided in the students Hostel or Guest House on sharing basis. Since, on-campus accommodation is limited, family members of the participants cannot be given accommodation by QIP-office.

### For information on other Quality Improvement Programmes at IITB, contact:

QIP Office, CE & QIP, IIT Bombay, Powai, Mumbai 400076. Tel. no. (022) 25767048.

Email: [qip@iitb.ac.in](mailto:qip@iitb.ac.in)

For further details: <http://www.qip.iitb.ac.in>

### FACULTY

The teaching faculty constitutes Prof. Yogendra Shastri, Department of Chemical Engineering, IIT Bombay and Prof. Bhavik Bakshi, Department of Chemical and Biomolecular Engineering, The Ohio State University, USA. The course will also feature guest speakers on specific topics.

### LECTURE NOTES

Hard copies of the lecture notes or presentations will be made available at the time of registration.

# QIP Short Term Course On Sustainable Engineering: Theory and Practice

**December 11-15, 2017**



Office of

Continuing Education & Quality

Improvement Programs



**Prof. Yogendra Shastri  
(Course coordinator)**

**Department of Chemical Engineering  
Indian Institute of Technology Bombay  
Powai, Mumbai 400076**

## INTRODUCTION

Achieving sustainable development by balancing the long-term economic, environmental and societal objectives is one of the most complex scientific problems of our times. Engineering designs need to increasingly incorporate these aspects in decision making. This task goes beyond the traditional areas of process development, process design, and industrial ecology. It becomes essential to take a holistic view and develop systems based solutions. It is also necessary to use new methods and tools to aid engineering design. The course will discuss basics of sustainability and the challenges in sustainable engineering. Different sustainability quantification methods along with their applications will be discussed. The course will then focus on assessment methods including life cycle assessment (LCA) and its variants. Different design approaches such as biomimicry and green engineering principles will also be discussed. The course will illustrate the application of these concepts using several case studies in the domain of energy, water, and municipal solid waste management.

## COURSE FORMAT

The course will be highly interactive consisting of the following specific components:

- Introductory lectures on selected topics
- Case study and illustrative examples
- Software demonstration / practice sessions
- Tutorial / hands-on training sessions
- Short field visit; Discussion and debate.

## WHO MAY BENEFIT

The course would benefit many across various disciplines of science and technology. It is of interest to serving teachers and researchers, PG and doctoral students, and laboratory scientists. Participants from various branches of engineering, including chemical, civil, environmental, mechanical, and industrial, as well as fields such as biotechnology and business administration will find this course useful.

## COURSE OUTLINE

### 1. Sustainability: Introduction (6 hours)

- Definition, dimensions and trade-offs
- Challenges in sustainable engineering design
- Sustainability indicators and indices

### 2. Life Cycle Assessment (LCA) (7.5 hours)

- LCA: Need and advantages
- Goal and scope, life cycle inventory, and impact assessment
- Software and databases with industrial problems/examples
- Additional topics in LCA

### 3. Design approaches (4.5 hours)

- Biomimicry and industrial ecology
- Principles of green engineering
- Resiliency and uncertainty

### 4. Integrated assessment (3 hours)

- Systems dynamics: Modeling and assessment
- Agent-based modeling

### 5. Case studies (7.5 hours)

- Energy, municipal solid waste management
- Domestic and industrial water management

### 6. Education: Course development (1.5 hours)

- Overview of existing courses
- Discussion of available resources

## LEARNING OUTCOMES:

At the completion, the participants would be able to:

- Understand and critique sustainability trade-offs
- Understand, compare, and critique different quantification methods
- Formulate and set-up simple LCA problems
- Use open source packages to develop LCA models
- Analyse LCA results to draw conclusions
- Develop simple systems dynamics models using open source software
- Understand and evaluate different design approaches for sustainability
- Understand challenges, opportunities and solutions in teaching sustainability

## QIP Short Term Course on Sustainable Engineering: Theory and Practice December 11–15, 2017

### Registration Form

Family Name (in block letters)\*: \_\_\_\_\_

Designation\*: \_\_\_\_\_

Organization\* : \_\_\_\_\_

Mailing Address\*: \_\_\_\_\_

Sex (M/F)\*: \_\_\_\_\_

Telephone : \_\_\_\_\_ Mobile no.\* \_\_\_\_\_

Email\*: \_\_\_\_\_

Highest Educational Qualification\*: \_\_\_\_\_

*Accommodation in Campus needed: YES / NO\**

Signature of Applicant\*

AICTE ID\*: [please click here](#)

Sponsorship & signature of Head of the College / Institute (with date & seal)\*.

(IMPORTANT: BY SIGNING ABOVE HEAD OF THE COLLEGE/INSTITUTE CERTIFIES THAT APPLICANT IS A FACULTY MEMBER OF DEGREE LEVEL ENGINEERING COLLEGE RECOGNIZED BY AICTE AND AICTE PERMANENT ID WRITTEN ABOVE IS CURRENTLY VALID).

\* Required fields otherwise application will be rejected.