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 important concepts in sustainable engineering through engineering design case studies. Different sustainability quantification methods, including indicators and indices, along with their applications will be discussed. The course will then focus on some important design methodologies including life cycle assessment (LCA) and its variants. This will be done using lectures and hands on sessions for specific design problems.

COURSE OUTLINE

1. **Sustainability: Introduction (4.5 hours)**
   - Sustainability and human well being
   - Dimensions of sustainability
   - Challenges in sustainable design with examples
2. **Sustainability quantification (3 hours)**
   - Need and challenges of quantification
   - Sustainability indicators and indices
   - Exergy and Emergy
3. **Life Cycle Assessment (LCA) (7.5 hours)**
   - LCA basics: Steps and methods
   - Software and databases with example problems
   - Eco-LCA (Ecologically based LCA)
4. **Systems dynamics (SD) for integrated assessment (3 hours)**
   - Importance of integrated assessment
   - Systems dynamic (SD) for integrated assessment
   - Examples with hands on session
5. **Biomimicry, uncertainty and resiliency (4.5 hours)**
   - Biomimicry and industrial ecology
   - Uncertainty in sustainable design
   - Resiliency and its role in sustainability
6. **Incorporating sustainability in curriculum (4.5 hours)**
   - Available tools and material
   - Discussion of different modes of offering

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

A Certificate of participation will be awarded to all the participants of the course.

LEARNING OUTCOMES:

At the completion of the course, the participants would be able to:
- Understand sustainability concept and its multi-disciplinary nature
- Identify and frame sustainability trade-offs of domain specific problems
- Understand, compare, and critique different quantification methods
- Identify appropriate indicators and indices for domain specific problems
- Formulate and set-up simple problems for performing LCA
- Use open source packages to develop LCA models
- Analyze LCA results to draw conclusions and provide recommendations
- Develop simple systems dynamics models using open source software

LECTURE NOTES

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

ELIGIBILITY

Faculty members of degree level engineering colleges recognized by AICTE are eligible to attend the course.

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.

VENUE FOR CLASSES

Course will be held at the Guest House Conference Room, IIT Bombay.

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.

TRANSPORT, BOARDING AND LODGING

Participants are entitled for Second Class (Sleeper Class) or III AC railway fare to and fro by the shortest route from college to IIT Bombay. All participants will be given auto fare from Kanjurmarg/Andheri Railway Station to IIT Powai on the dates of arrival and departure. Local participants will be paid second class railway fare or BEST Bus fare. **Boarding and lodging will also be provided free of cost in the students Hostels only for participants.**

REGISTRATION

All short-listed candidates are required to confirm their participation by sending a **Demand Draft of Rs. 1,000/- in the name of "Registrar IIT Bombay"**. The above amount will be refunded to the participant if he/she attends the course. In case a participant does not attend the course, the above amount will be forfeited.

IMPORTANT DATES

Last date for receipt of registration form: **July 27, 2016**
Notification of acceptance: **July 29, 2016**

Note: Incomplete application forms will not be considered. For additional copies of the registration form, please use a photocopy or type in the format given.

Completed registration forms to be sent to the course coordinator at the following address (please send an e-mail to notify if sending a paper application):

Prof. Yogendra Shastri,
Course Coordinator,
Department of Chemical Engineering,
Indian Institute of Technology Bombay,
Powai, Mumbai – 400 076.
Phone : (022) – 2576 7203
Fax   : (022) – 2572 6895
Email : yshastri@iitb.ac.in

QIP Short Term Course on

Sustainable Engineering: From Concepts to Design Solutions

August 3-7, 2016

Coordinator

Prof. Yogendra Shastri
Department of Chemical Engineering

Office of
Continuing Education & Quality Improvement Programme

Indian Institute of Technology Bombay
Powai, Mumbai – 400 076

R E G I S T R A T I O N   F O R M

Five day QIP Course on

Sustainable Engineering: From Concepts to Design Solutions

August 3-7, 2016

NAME (BLOCK LETTERS) : _____

_____ GENDER: M / F

DESIGNATION : _____

ORGANIZATION: _____

MAILING ADDRESS : _____

_____

TELEPHONE : _____ (O) _____ (R)

FAX: _____ MOBILE: _____

EMAIL : _____

QUALIFICATIONS : _____

ACCOMMODATION REQUIRED: YES / NO

I confirm that my institute is an AICTE approved institute.

SIGNATURE OF APPLICANT:

Sponsorship and signature of Head of the College/Institute (with date and seal):