

# Complexity in chemical kinetics: Experimental and modelling approaches

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## Overview

Industrially important chemical reactions are manifestations of complex underlying networks of catalytic and chemical processes. The design, operation, analysis and control of reaction equipment have thus to be based on a sound understanding of the kinetics of the processes within. Further, it is impossible to prepare chemically/biochemically active material (such as catalysts and enzymes) without kinetic characterization. Progress in over 90% of industrial chemical (especially catalytic) processes depends critically on (a) measurement and interpretation of composition changes arising from the reactive processes in the system, and (b) developing an insight into the underlying reasons for these changes. These then are the essential aims of Chemical Kinetics.

Presently, chemical kinetics is an area of challenges and adventures, in which at least four disciplines intersect: chemistry, physics, chemical engineering and mathematics. The goals of kinetic investigations (kinetic modelling) are: (1) obtaining kinetic dependencies for the design of efficient chemical/catalytic processes and reactors (2) characterizing with precision the rates of chemical transformation over active materials such as catalysts, adsorbents, electrodes, sensors, membranes, enzymes etc; (3) revealing the networks of the chemical reactions involved in the overall process. The present course addresses the challenges in meeting these goals. Theoretical and methodological concepts are illustrated throughout by many examples taken from industrial

practice of heterogeneous catalysis, combustion and enzymatic processes. The course uniquely combines basic knowledge and results obtained recently at the frontiers of this science with applications to live industrial problems. There will be an industry masterclass towards the end of the course in which the participants are encouraged to discuss problems of interest to their activity with the course faculty.

The course will be delivered by internationally known faculty with a vast experience in teaching, research and industrial consultancy. The main instructor of the course is Prof Gregory S. Yablonsky, whose recent book with Guy. B. Marin has been widely acclaimed as breaking new ground in the treatment of complexity in chemical kinetics.

<b>Course dates</b>	<b>Nov 20, 2017 – Dec 01, 2017 with an Industry Masterclass on Nov 30 and examination on Dec 01.</b> <b>Number of participants for the course will be limited to fifty.</b>
<b>Who can attend:</b>	<ul style="list-style-type: none"><li>▪ Executives, engineers and researchers from manufacturing, design/consultancy and government organizations including R&amp;D laboratories.</li><li>▪ Graduate and research students (MTech/PhD); Faculty from reputed academic and technical institutions. BTech/BE students in their final year with a good background in basic kinetics and reaction engineering can also attend.</li></ul>
<b>Fees</b>	The participation fees for taking the course is as follows: <b>Participants from abroad: US \$500</b> <b>Participants from Indian Industry/ Research Organizations: Rs. 30000</b> <b>Participants from Indian Academic Institutions: Rs. 10000</b> The above fees include all instructional materials, and access to internet facility. The participants will be provided with accommodation on payment basis.

## The Faculty



**Prof. Gregory S Yablonsky** is affiliated with the Department of Chemistry, St. Louis University, and the Department of Energy, Environment and Chemical Engineering, Washington University in St Louis. His research interests are in the broad areas of complexity in chemical kinetics, mathematical modelling of chemical reactors and reactive processes, and heterogeneous catalysis. He is the author of several books and monographs in both English and Russian languages, and over 150 publications.



**Prof Akkihebbal K. Suresh** holds an Institute Chair in the Department of Chemical Engineering at IIT Bombay, and is currently also the Deputy Director of the Institute in charge of Academic and Infrastructural Affairs. His research interests are in the broad areas of transport and reaction, with current research being on membrane forming processes, solid state reactions, liquid phase organic oxidations and some fundamental issues on heterogeneous transport-reaction processes. He has authored about 75 publications in international journals, a similar number of conference presentations, and two patents.

## Course Co-ordinator

**Prof. Akkihebbal K. Suresh**  
Phone: 022-25767240; 25767010  
E-mail: aksuresh@iitb.ac.in

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<http://www.gian.iitkgp.ac.in/GREGN>

## GIAN Short Term Course on

**Complexity in chemical kinetics: Experimental and modelling approaches**

**Nov 20 – Dec 01, 2017**

### Registration Form

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

\_\_\_\_\_

Qualification:

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

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

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

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Mobile: \_\_\_\_\_

Fax: \_\_\_\_\_

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

Payment: Rs: \_\_\_\_\_

DD No.: \_\_\_\_\_ Dt: \_\_\_\_\_

(DD in favour of "Registrar, IIT

Bombay – CEP a/c")

#### **Or NEFT/ RTGS**

(Please furnish the foll. details if NEFT/RTGS)

Name of A/c Holder

UTR NO./Transaction ID

Name of Bank & Branch

Date of Payment

Amount

IIT Guest House/ Hostel accommodation required:

YES / NO

Signature of Applicant: \_\_\_\_\_

Date:

#### **Venue for Classes**

Classes will be held in Seminar Hall (Room 240) of Department of Chemical Engineering, IIT Bombay.

#### **Lecture Notes**

To fully realize the objectives of the course, the lecture notes will be made available at the time of registration at IIT Bombay.

#### **Date & Time of Registration:**

20<sup>th</sup> November 2017, 9.00 AM at Chemical Engg Department, IIT Bombay.

#### **COURSE FEE**

**Participants from abroad: US \$500/-**

**Industry/ Research Organizations: INR: 30000/-**

**Academic Institutions/ Faculty/ NGO: INR: 10000/-**

**Students & Research Scholars: INR: 5000/-**

The above fees include all instructional materials, computer use for tutorials and assignments, and access to internet. Accommodation is subject to availability, and is on payment basis.

The fees may be paid by demand draft drawn in favour of "**The Registrar, IIT Bombay - CEP Account**".

#### **Or through NEFT/RTGS:**

Name of beneficiary: Registrar, IIT Bombay

Account name: IIT Main Account

Name of Bank: State Bank of India, IIT Powai

Beneficiary A/C No: 00000010725729128

Bank MICR Code: 400002034

IFSC Code: SBIN0001109

SWIFT Code: SBININBB519