TWO-WEEK GIAN COURSE ON

COMPUTATIONAL MODELING OF BIOLOGICAL AND ENGINEERING SYSTEMS

(Sponsored by Ministry of Human Resource Development (MHRD), Under the Scheme 'GIAN')

(30th October, 2017 - 8th November, 2017)

Overview

In all sciences and engineering, models are used to represent, usually in an abbreviated form, a more complex and detailed reality. Models are used because in some way, they are more accessible, convenient, or familiar to practitioners than the subject of study. Models can serve as explanatory or pedagogical tools, represent more explicitly the state of knowledge, predict results, or act as the objects of further experiments. Computational models – simulations - represent the other end of the modeling spectrum. Simulation is often necessary to explore the implications of a model, especially its dynamical behavior, because human intuition about complex nonlinear systems is often inadequate. This course introduces the concepts of mathematical and computational modeling of biological and engineering systems.

This course mainly consists of three topics and those should be taken together. The topics include Biological and Engineering Modelling along with Simulation.

Course participants will learn these topics through lectures and hands-on experiments. Also case studies and assignments will be shared to stimulate research motivation of participants.

OBJECTIVES

The primary objectives of the course are as follows:

- Exposing participants to abstraction and simplification of biological and engineering systems through modeling in order to gain new insight into biological and engineering phenomena.
- Building in confidence and capability amongst the participants in the application to distinguish between different approaches to modeling (deterministic, stochastic) and critically evaluate the suitability of these alternative approaches for particular biological or engineering problems.
- Enhancing the capability of the participants to develop computer programs that implement and solve simple models of biological and engineering phenomena.

<table>
<tr><td>Course Contents</td><td>

First Order ODE-Computational models.
Epidemiology–Computational models with dynamical systems.
Ecology-Computational Model with dynamical systems.
Optimal control computational models in epidemiology and ecology.
Nano fluid Dynamics.
Entropy generation analysis in fluid flow.
A co-infection model of diseases.
Optimal Control of HIV/AIDS in the Workplace.
Fluid-based computational models.
Hermite – Pade´, Adomian-Padé and VIM-Padé approach.

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<tr><td>You should attend if you are...</td><td>
1. Engineers from industry and government organizations including R&D laboratories, who are involved with the analysis of problems in the aeronautical, automobile, mechanical, civil, chemical, and other engineering disciplines as well as in applied sciences.
2. Student at all levels (BTech/MSc/MTech/PhD) and faculty from reputed academic institutions and technical institutions.
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<tr><td>Registration Fees*</td><td>
Participants from Abroad: US $600
Industry/ Research Organizations: Rs. 6000/-
Faculty Members / Researchers: Rs. 2000/-
Students**(pursuing PhD, Masters / Bachelors courses): Rs 1000/-
NIT Puducherry: Free (Faculty / Students / Research Scholars)

*Registration fee only includes attendance to sessions, course material and lecture notes.
**UG and PG students need to produce a document as a proof of Student Identification and a letter of nomination from their Institute/College.
The registration fee has to do Electronic Fund Transfer/Cash Deposit:

<table>
<tr><th>Bank Name</th><th>State Bank of India</th></tr>
<tr><td>Bank Address</td><td>No : 72, Bharathiyar, Road, Karaikal –609602</td></tr>
<tr><td>Account Name</td><td>Scholarships & Deposits Account</td></tr>
<tr><td>Account No.</td><td>32912184337</td></tr>
<tr><td>IFSC code</td><td>SBIN0001418</td></tr>
</table>
To register or for any questions please send an email to kkr.nitpy@gmail.com, Kaladhar@nitpy.ac.in
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Registration

Register for the course online at http://www.gian.iitkgp.ac.in/ The last date of registration is **20th October 2017**.

Number of participants for the course is limited to 50.

Course Faculty

Prof. O. D. Makinde (MFR)
Faculty of Military Science, Stellenbosch University, South Africa
Senior Professor of Applied Mathematics & Computations
Fellow: African Academy of Sciences
Fellow: Papua New Guinea Mathematical Society
Secretary General: African Mathematical Union
Winner: NSTF/NRF TW Kambule Senior Researcher 2009/2010 Award
Winner: AU-Kwame Nkrumah Continental Scientific 2011/2012 Award
Google scholar profile: **http://scholar.google.co.za**/citations?user=00NF_EwAAAAJ&hl=en

Professor Oluwole Daniel Makinde is a Distinguished Professor of Applied Mathematics and Computations at the Faculty of Military Science, Stellenbosch University, South Africa. Heis also a visiting Professor to the NM-AIST in Arusha-Tanzania; PAUISTI in Nairobi- Kenya and AUST in Abuja Nigeria. Prior to his present appointment he was a Senior Professor & Director of Postgraduate Studies and the founding Director of Institute for Advanced Research in Mathematical Modelling and Computations at Cape Peninsula University of Technology, South Africa (2008-2013); Full Professor and Head of Applied Mathematics department at University of Limpopo (former University of the North) South Africa (1998-2008).He is an NRF-rated researcher. Prof. Makinde authored four Applied Mathematics Textbooks & Monographs and published over 250 research papers in many reputable international journals worldwide. He has supervised and graduated over 25 PhDs, 80 MSc and 300 BSc (Hons) candidates in the field of Applied and Computations Mathematics across the African continent. Professor Makinde is a Fellow of African Academy of Sciences, Fellow of Papua New Guinea Mathematical Society, the Secretary General of African Mathematical Union, former Vice-President and General Secretary of Southern African Mathematical Sciences Association (2000-2004); Associate member of ICTP (2000- 2005), founding Academic advisory board member of AIMS in South Africa (2003-2005) and an associate member of National Institute of Theoretical Physics (NITheP) in South Africa.

Prof. O. D. Makinde can be contacted by email on makinded@gmail.com and makinded@sun.ac.za

Course Coordinator & Contact Information

Dr. Kaladhar Kolla
Assistant Professor
Department of Mathematics
National Institute of Technology Puducherry,
Karaikal-609609
Mobile: +91 7598198022
Email: Kaladhar@nitpy.ac.in
Web page: http://nitpy.ac.in/departments/science-and-humanities/faculty-and-staff/index.html

Dr. Kaladhar Kolla is an Assistant Professor in the Department of Mathematics, National Institute of Technology Puducherry. His research areas of interest include Heat and Mass Transfer in Porous Media, Boundary Layer Flows, Polar fluids, Computational Methods, etc. At present he is handling Research projects funded by UGC, CSIR.