



INTERNATIONAL SUMMER & WINTER TERM

May - July | December 2014



International Summer & Winter Term
Continuing Education Cell
Indian Institute of Technology Kharagpur
Kharagpur – 721302, India
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INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR



INTERNATIONAL SUMMER & WINTER TERM

INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

May - July | December 2014

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Overview

Indian Institute of Technology Kharagpur is starting its first international summer and winter term (ISWT) where the national and international participants will get an opportunity to seek knowledge and experience from the reputed International faculty through intensive study of subjects and personal interactions. By bringing together participants and faculty from India and around the world, the ISWT will not only be academically stimulating but also offer an opportunity to make new friends and to interact with international experts.

Participants from Industry, Research Organisations, Faculty and Students from all over the world are welcome to register for the 19 subjects offered during the summer term and 9 subjects during the winter term. These subjects are designed around current and multidisciplinary themes of Science, Engineering, Management and Law. The duration for each subject is of 2 weeks or 10 working days with a judicious blend of lectures and tutorials per day.

IIT Kharagpur will issue a course completion certificate to all participants that attend classes regularly. The students registered for these courses, optionally, will have the opportunity to obtain additional academic credits based on the evaluation and grading process. His/her home university/Institute will be mainly responsible for transferring ISWT academic credits. IIT Kharagpur will only provide information on the grading system, subject syllabus, and the academic policy.



About IIT Kharagpur

History

First in the chain of IITs to be set up by the Government of India, Indian Institute of Technology, Kharagpur started in 1951 in the erstwhile Hijli Detention Camp. It has now blossomed into one of the finest technical institutions in the world, with 585 faculty members in 19 Departments, 9 Centers, and 12 Schools offering 6 M.Sc. programmes, 5 Joint M.Sc. - Ph.D. programmes, 15 B.Tech (Hons.) programmes, 49 joint M.Tech. - Ph.D programmes, 2 M.Tech. programmes (in video-conferencing mode), 1 Master of City Planning programme, 1 Master of Medical Science and Technology programme, 1 LL.B. in Intellectual Property Rights programme, 34 Dual-Degree (both B.Tech and M.Tech) programmes, and 2 Management programmes. It also has MS, Ph.D, and D.Sc. programmes.

Location

Kharagpur is known world over for two landmarks. One, the longest railway platform, and the other, the Indian Institute of Technology, more commonly known as IIT. Situated about 120 km west of Kolkata, Kharagpur can be reached in about 2 hours by train from Howrah railway station of Kolkata or 3 hours by car from Kolkata Airport. Kharagpur is also connected by direct train services to most major cities of the country. The Institute is about 10 minutes drive (5 km) from the Kharagpur railway station. Private taxi, autorickshaw or cycle-rickshaw can be hired to reach the Institute.

Weather

Winter (October to February) is moderate and pleasant (10 to 25 C) in Kharagpur. Summer (March to June) is hot (25 to 40 C) and sometimes humid. Rains are normally confined to the months of June to September.

Banks

Three banks are located inside the Campus. The State Bank of India is close to the Institute and provides foreign exchange facilities also. The Syndicate Bank is situated on the first floor of the Institute main building. The Punjab National Bank is situated in the Tech Market where business transactions are carried out in the afternoon.

Library

The Central Library offers about 300,000 volumes in an open shelf system on different fields of science and technology, humanities and social sciences. The library subscribes to about 1400 periodicals. The library system is fully computerized and users can access foreign university libraries through wide-area network facilities.

Computer Network

The backbone of IIT Kharagpur network is based on gigabit fibre optic technology. All the Departmental LANs are connected to the gigabit fibre optic backbone as separate VLANs. Email and internet facilities are provided to all laboratories, faculties, all rooms in guest houses and halls of residences.

Places to visit

Nehru Museum, Hijli Shahid Bhavan, Old Prison Cells, Martyrs Memorial.



Accommodation

The institute is fully residential. Students are accommodated in 20 Halls of Residence and the staff is provided with quarters. Accommodation for visitors is arranged in the Technology Guest House, CEC Guest House, Alumni Guest House or CTS Visitors Hall, or if need arises, in a students' Hall of Residence.

Accommodation Tariffs

Sl No.	Name of Guest House/Hostel	Type of Accommodation	Rate in ₹ per day per person
1.	Technology Guest House (TGH)	Double bedded room (AC) on sharing basis (per person)	600.00
2.	Technology Guest House (TGH)	Single occupancy in double Bedded (AC)	800.00
3.	Visveswaraya Guest House (VGH)	Double bedded room on sharing basis (per person) (AC)	200.00
4.	Visveswaraya Guest House (VGH)	Single occupancy in a double bedded room (AC)	300.00
5.	Visveswaraya Guest House (VGH)	Double bedded (Non-AC)	200.00
6.	Visveswaraya Guest House (VGH)	Single occupancy in double bedded room (Non-AC)	150.00
7.	Visveswaraya Guest House (VGH)	3/4 bedded room per person (Non-AC)	100.00
8.	Ashotosh Mukherjee Guest House (AMGH)	Single bedded (AC)	300.00
9.	Transit Hostel	4 bedded rooms per person (Non-Ac)	80.00
10.	Transit Hostel (Ladies only)	3/4 bedded rooms per person (AC)	125.00
11.	Transit Hostel (Ladies only)	3/4 bedded rooms per person (Non-AC)	80.00



SUMMER TERM			
Course Code	Course Title	Principal Co-ordinator	Duration
IST0101	Geological Exploration by Ground Penetrating Radar	Prof. Amitabha Bhattacharya	May 12 - May 23
IST0102	Introduction to Global Spectral Modeling	Prof. Arun Chakraborty	May 15 - May 30
IST0103	Portfolio Optimization	Dr. Geetanjali Panda	May 19 - May 30
IST0104	Thermal Processing of Foods	Dr. A. K. Datta	June 02 - June 13
IST0105	Advanced Technologies for waste Water Treatment and Recycling	Prof. Sudarsan Neogi	June 02 - July 15
IST0106	Modelling in Fluvial Processes	Prof. Subhasish Dey	June 09 - June 20
IST0107	Engineering Asset Management	Prof. Pradip Kumar Ray	June 09 - June 20
IST0108	Advanced Plasma Processing (ICP and CCP): Fundamentals & Applications	Prof. Sudarsan Neogi	June 16 - June 27
IST0109	Advanced Formal Techniques in Design, Verification and Testing of Digital Integrated Circuits	Prof. Indranil Sen Gupta	June 16 - June 27
IST0110	Microwave Imaging	Prof. Amitabha Bhattacharya	June 16 - June 27
IST0111	Geospatial Technologies in Hydrological Modeling	Prof. N. S. Raghuvanshi	June 16 - June 27
IST0112	Numerical Ocean Modelling	Dr. C. Shaji	June 16 - June 28
IST0113	Biofuels: Policy and Law	Dr. Saikat Chakraborty	June 23 - July 04
IST0114	Distortion Prediction and Control of Large Ship Structural Units	Prof. N. R. Mandal	June 30 - July 11
IST0115	On-site waste water treatment and disposal	Dr. Damodhara R. Mailapalli	June 30 - July 11
IST0116	Big Data Analytics	Prof. Ram Babu Roy	June 30 - July 11
IST0117	Hydrology and Climate Change	Dr. Rajendra Singh	July 01 - July 11
IST0118	Methods & Techniques in Cognitive and Clinical Neuroscience	Prof. Gautam Saha	July 02 - July 12
IST0119	Communication Strategies for Change	Dr. Anjali Gera Roy	July 16 - July 26
	Lecture Series by Prof. Sir Michael Berry	Prof. Pragma Shukla	May 21 - May 29
WINTER TERM			
IWT0120	Geostatistics in Ecological Modelling	Prof. M. D. Behera	Nov 24 - Dec 06
IWT0121	Introduction to Geophysical Fluid Dynamics	Prof. Arun Chakraborty	Dec 02 - Dec 17
IWT0122	Geonomics, Metagenomics and Metabolic Engineering	Prof. Pinaki Sar	Dec 08 - Dec 18
IWT0123	Micro & Nano-scale Transport for Bio and Energy Applications	Prof. Surman Chakraborty	Dec 08 - Dec 19
IWT0124	Spatial Ecology & Remote Sensing	Prof. M. D. Behera	Dec 15 - Dec 27
IWT0125	Aircraft Design Practices	Prof. P. K. Datta	Dec 22 - Dec 31
IWT0126	Multi-Scale Modeling of Advanced Materials	Prof. B. N. Singh	Dec 22 - Dec 31
IWT0127	High Power Microwaves	Prof. Amitabha Bhattacharya	Dec, 2014
IWT0128	Turbulence in Hydraulically Rough Flows	Prof. Subhasish Dey	Dec, 2014

Distinguished International Faculty

SUMMER TERM		
Course Code	International Faculty	Affiliation
IST0101	Prof. Dr. Ir. M. Sebastien Lambot	Universite Catholique de Louvain (UCL), Belgium
IST0102	Prof. T. N. Krishnamurti	Florida State University, Tallahassee, USA
IST0103	(1) Prof. Duan Li (2) Prof. Xiangyu Cui	(1) The Chinese University of Hong Kong (2) Shanghai University, China
IST0104	Dr. K. P. Sandeep	North Carolina State University, USA
IST0105	Prof. Ajay Ray and Prof. Madhumita Ray	University of Western Ontario, Canada
IST0106	Prof. Thanos Papanicolaou	The University of Tennessee at Knoxville, Tennessee, USA
IST0107	Prof. Gopinath Chattopadhyay	Central Queensland University, Queensland, Australia
IST0108	Prof. Maher Boulos	Tekna Systems Plasma Inc and Tekna Advanced Materials, Quebec Canada
IST0109	Prof. Rolf Drechsler	University of Bremen, Germany
IST0110	Prof. Magda El-Shenawee	University of Arkansas, USA
IST0111	Prof. V. Sridhar	Virginia Polytechnic Institute and State University, USA
IST0112	Prof. Tad Murty	University of Ottawa, Canada
IST0113	to be announced shortly in the website	
IST0114	Prof. Hidekazu Murakawa and Dr. Niinshu Ma	Joining and Welding Research Institute, Osaka University, Japan
IST0115	Prof. K. G. Karthykeyan	University of Wisconsin-Madison, Madison, Wisconsin, USA
IST0116	Prof. I. Jen Chiang	Taipei Medical University, Taipei, Taiwan
IST0117	Prof. Vijay P. Singh	Texas A and M University, Texas, USA
IST0118	Prof. Joydeep Bhattacharya	University of London, London, UK
IST0119	(1) Dr. Rob Cover (2) Prof. David J. Schaefer	(1) University of Western Australia, Perth (2) Franciscan University, Ohio, USA
	Prof. Sir Michael Berry	Melville Wills Professor of Physics (Emeritus), University of Bristol, UK
WINTER TERM		
IWT0120	Dr. Abani Ranjan Samal	Rio Tinto (Technology and Innovation), Greater Salt Lake City, USA
IWT0121	Prof. Avijit Gangopadhyay	University of Massachusetts Dartmouth, USA
IWT0122	Prof. G. N. Bennett	Rice University, Houston, USA
IWT0123	Prof. Sushanta K. Mitra	University of Alberta, Edmonton, Canada
IWT0124	Dr. Anu Swatantran	University of Maryland, College Park, USA
IWT0125	Prof. Chandruk Kong	Chosun University, Korea
IWT0126	Prof. Samit Roy	University of Alabama, USA
IWT0127	Dr. D. V. Giri	PRO-TECH, Alamo, California, USA
IWT0128	Prof. Vladimir Nikora	University of Aberdeen, Aberdeen, UK

Geological Exploration by Ground Penetrating Radar

Overview

Exploration of natural resources buried under the earth surface is a well-known engineering activity. However, with the space exploration of planetary bodies, GPR technology promises to unravel the subsurface contents of extraterrestrial bodies. But to use it successfully, one needs to master the arts and sciences of microwave propagation, ultrawideband technique, radar principles and radar signal processing. The course aims to take a step forward to unravel the mysteries of this fascinating technology.

This course is organized in two modules that should be taken together. The topics in Module A will expose the participants to the entire gamut of GPR technology like Electromagnetic Properties of ground materials, GPR Antennas design, GPR Channel Modeling and simulation, GPR Systems design and GPR Signal Processing. In Module B, the Geophysical Exploration methodology with GPR is emphasized. The topics in the module include Planetary Geological Exploration, Subsurface Mine Detection, Regulatory and EMC constraints of GPR, Remote Sensing with SAR and exploration with the help of SAR imagery.

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.

Modules

A: GPR Technology : May 12 - May 17
B: Geophysical Exploration by GPR : May 19 - May 23
Number of participants for the course will be limited to fifty.

You Should Attend If...

- you are an electronics engineer or research scientist interested in designing ground penetrating radar and processing of microwave images for exploration.
- you are geologist or geophysicist or non-destructive test engineer interested to learn application of GPR in your profession.
- you are a student or faculty from academic institution interested in learning how to do research on GPR system or subsystem or want to work with GPR imagery for geological interpretation.

Fees

The participation fees for taking the course is as follows:

Participants from abroad : US \$500

Industry/ Research Organizations: ₹ 30000

Academic Institutions: ₹ 10000

The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Prof. Sébastien Lambot is in the faculty of Université catholique de Louvain (UCL) Belgium. His research interests include Hydrogeophysics, Electromagnetic modeling including antenna modeling, coupled hydrogeophysical inversion, soil hydrodynamics, digital soil mapping and remote sensing.



Tapan Misra is the Deputy Director of Space Application Centre, Ahmedabad. His research interest is development of SAR based sensors for various space missions of ISRO and development of algorithms for high resolution processing of microwave SAR imagery.



Dr. Amitabha Bhattacharya is an Associate Professor of Indian Institute of Technology, Kharagpur. His research interest is Microwave Imaging, High Power Microwaves and Microwave Stealth Technology.

Course Co-ordinator

Prof. Amitabha Bhattacharya

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Introduction to Global Spectral Modeling

Overview

The spectral modeling approach to numerical weather prediction is being practiced in the world for long time because of several advantages over grid point. Historically, the spectral approach came into atmospheric sciences from studies of Geomagnetism, where it was introduced by Elsasser in the late nineteenth century. The first attempt of spectral representation of data sets and its use via simple vorticity conserving models came in the 1940s. The works of Neamtan from the University of Manitoba in the year 1946 and Craig from New York University in the year 1945 were pioneering during this era. These were still close to linear problems, lacking any formalism for addressing the nonlinear advective dynamics. It was in the late 1950s when we saw the emergence of formal proposals for the solution of the nonlinear barotropic vorticity equation. Pioneering work from the University Chicago by Platzman in the year 1960 and Baer in the year 1964 explored what is sometimes called the interaction coefficients approach for the nonlinear problem. Around the same time at MIT we saw the elucidation of what are now called the low-order systems. This pioneering work of Lorenz in the year 1960 and Saltzman in the year 1959 brought to us the first exposure to simple nonlinear systems and the concept of chaos. These simple three-component systems demonstrated some of the essentials of nonlinear dynamics and the growth of errors arising from initial state uncertainties. The interaction coefficients approach to the solution of the weather forecast problem led to unmanageably large memory requirements that were not easily amenable to the then available, or even to the present, memory of computers. It was during the mid-1950s when the Cooley-Tukey algorithm in the year 1965 emerged and provided a break through via the fast Fourier transform. This was exploited and demonstrated to provide accurate representations of the quadratic terms for fast computation of the nonlinear advective dynamics from the University of Copenhagen and from Orszag in the year 1970 at MIT. Thereafter, we saw a rapid development of global spectral models in many parts of the world, especially Australia, Canada, England, Japan, and the United States. Numerous others have contributed to these developments.

Although the spectral model is being used for weather prediction but for better prediction over the tropical region we need more understanding. This course will help the students to gain in-depth understanding of the subject.

Modules

A: Mathematic aspects of the Global Spectral Model and Physical Process : May 15 - May 25

B: Multilevel Global Spectral Model and Spectral Energetics : May 20 - May 30

The course material contains two modules.

Number of participants for the course will be limited to fifty.

You Should Attend If...

- you are a scientist or engineer working in the area of atmospheric science/ climate science and modeling and interested to learn more about global spectral modeling.
- you are a student or faculty from academic institution interested in learning how to formulate models for process studies of the atmosphere, and how to solve them with advanced computer tools.

Fees

The participation fees for taking the modules is as follows:

Participants from abroad : US\$ 500

Industry/ Research Organizations/Student : All modules : ₹ 20000

Academic Institutions: All modules : ₹ 10000

The above fee include all instructional materials, computer use for tutorials, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Prof. T. N. Krishnamurti is an eminent Professor of Meteorology at Florida State University Tallahassee, USA. His research interests include high resolution hurricane forecasts on short, medium range & monthly time scale and studies of inter seasonal and interannual variability of the tropical atmosphere. Among his many accomplishments, Prof. Krishnamurti led a team of Florida State University meteorologists, under the sponsorship of the university's Real-Time Hurricane Forecast Center (RTHFC). The RTHFC developed a new forecasting method called the Super ensemble which has shown enormous potential in accurately predicting hurricanes, droughts, and floods. His remarkable contribution to NASA's Tropical Rainfall Measuring Mission (TRMM) and NASA's Laser Atmospheric Wind Sounder (LAWS) is very greatly appreciated. He has been awarded the Sir Gilbert Walker Gold Medal by the Indian Meteorological Society, the prestigious International Meteorological Organization Prize (in 1996) from the World Meteorological Organization and the Carl Gustav-Rossby Research Medal of the American Meteorological Society for his lifetime and extraordinary contributions to monsoons, cyclone, weather and climate modeling science.



Dr. Arun Chakraborty is associate professor and head of the Center Oceans, Rivers, Atmosphere and Land Sciences (CORAL), Indian Institute of Technology Kharagpur. His research has focused mainly on Ocean dynamics, ocean circulation, modeling of the Bay of Bengal and Data Assimilation. He has several publications in reputed national and international journals. Professor Chakraborty is frequently invited to give guest talk in various universities and institutes. He has been offered as James Rennell Fellow by the Ministry of Earth Sciences, Government of India for his valuable contribution towards ocean science.

Course Co-ordinator

Prof. Arun Chakraborty

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Portfolio Optimization

Overview

Many financial portfolio selection problems ranging from asset allocation to risk management, from option pricing to model calibrations, can be solved by optimization techniques. Portfolio optimization is the job of diversification of assets in an efficient way to maximize the return and minimize the risk using recent advanced optimization techniques. The purpose of this course is to describe the process of portfolio optimization techniques employed for investment in financial market. In addition, implementation of various financial optimization techniques with real data from Bombay Stock Exchange, India will be discussed

This course is organized in two modules that can be taken altogether or in subsets. The material in each module is self-contained.

Dates	May 19 - May 30, 2014
Modules	<p>A : Optimization Techniques used in Financial markets Duration: 19 May 2014 to 23 May 2014 Course Content: Basic concepts used in financial markets and institutions: Equity market, Derivative market, Short term financing, Derivative securities and asset pricing, Index fund, Asset/liability cash flow matching, Risk measures, Portfolio performance measures. Basic Optimization Techniques: Linear programming, Quadratic Programming, Integer Programming, Stochastic Programming, Multi-objective programming.</p> <p>Module B: Portfolio Optimization Models for Investment Duration: 26 May 2014 to 30 May 2014 Course Content: General framework of utility maximization in portfolio selection, Markowitz mean variance optimization model, Mean variance models with marginal risk and systematic risk control, Robust mean variance model, index tracking model, Multi-period mean variance model, Portfolio optimization models with transaction cost, Portfolio performance models, Portfolio Rebalancing Model. Short term financing model, dedicated portfolio model, Hand on training with data from Bombay Stock Exchange/National Stock Exchange, India.</p> <p>Number of participants for the course will be limited to fifty.</p>
You Should Attend If...	<ul style="list-style-type: none"> ▪ you are an industry/R&D professional, interested in learning portfolio optimization techniques. ▪ you are a student of B.Tech/M.Sc/M.Tech/Ph.D or faculty from academic institution with sufficient knowledge in undergraduate mathematics <p>Prerequisite for the course: Sufficient knowledge at undergraduate level mathematics.</p>

Fees

The participation fees for taking the modules is as follows:

Participants from abroad : US \$500

Industry/ Research Organizations: Any of two modules : ₹ 20000, All modules : ₹ 30000

Academic Institutions: Any of two modules : ₹ 10000, All modules : ₹ 15000

The above fee includes all instructional materials, computer use for tutorials, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty

The course is planned and offered as per the norms set by IIT Kharagpur for ISWT subject. Internationally acclaimed academics, researchers and practitioners with proven knowledge, experience, and demonstrable ability in teaching, consultancy, research, and training in the field of financial mathematics and optimization techniques will deliver lectures and discuss cases in the course. Resource persons include professors from Department of Mathematics, IIT Kharagpur, Vinod Gupta School of Management, IIT Kharagpur and following international faculties.



Prof Duan Li, Department of Systems Engineering and Engineering Management, The Chinese University of Hong Kong, Hong Kong. Prof. Duan Li was a faculty member at Department of Systems Engineering, the University of Virginia from 1987 to 1994, where he also served as Associate Director of Centre for Risk Management of Engineering Systems. He joined the Department of Systems Engineering and Engineering Management, the Chinese University of Hong Kong, in December 1994, where he is currently Patrick Huen Wing Ming Professor. Duan Li's research interests include optimization, optimal control, financial engineering and operations research. He is currently Vice President of National Society of Mathematical Programming, Vice President of Chinese Society of Financial Systems Engineering, and Academic Committee Member, Chinese National Research Centre of Mathematics and Cross-Disciplinary Science, Department of Finance and Economics.



Prof. Xiangyu Cui, School of Statistics and Management, Shanghai University of Finance and Economics, China. Prof Cui has several years of experience in teaching and research in the area of Financial Engineering, Quantitative Finance, including portfolio selection, risk management and stochastic control.

Course Co-ordinators

Dr. Geetanjali Panda

Principal Coordinator

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Prof U. C. Gupta

Coordinator

Professor and Head, Department of Mathematics, IIT Kharagpur, India. Phone No: +913222282276(O).

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Thermal Processing of Foods

Overview

This course is organized with the specific objective of providing the fundamental and practical aspects of design and validation of thermal processing and packaging of food products on an industrial scale for batch and continuous processes with the goal of maximizing product quality and ensuring food safety using conventional and advanced processing technologies. Starting with a review of material and energy balance, fluid mechanics, and heat transfer, the foundation for the course will be laid by a discussion of measurement of various process parameters such as temperature, pressure, and flow; providing an overview of pump choices; categorizing foods and their properties; and providing an overview of microbiology as it relates to thermal processing. The next section will deal with blanching, pasteurization, and sterilization and the associated equipment. Pasteurization of milk and canning of various foods will be covered in this section. Kinetics of reactions (D , z , F , C , and Q_{10} values) associated with safety, quality, and shelf life of foods will be addressed and techniques to optimize processes will be discussed. This will be followed by a discussion of changes that take place in foods during processing and storage and ways to quantify these changes using time-temperature integrators. Analytical methods involving convective and overall heat transfer coefficients will be emphasized with particular reference to heat exchanger design calculations. Various processing techniques such as minimal processing, hot-fill, and aseptic processing & packaging of foods will be discussed. Alternative processing technologies including thermal methods such as microwave and ohmic heating and non-thermal methods such as high pressure processing, pulsed electric field processing, and irradiation will be touched upon. The approach to be adopted for mathematical modeling of various thermal processes will be discussed. Special coverage is reserved for the field of packaging as it relates to thermally processed foods. Food plant engineering systems and sanitary requirements will be covered along with a discussion on fouling, cleaning, and disinfecting. The course will conclude with a discussion of practical aspects associated with thermal process validation and compliance with international regulatory requirements.

Dates

June 2 - June 13, 2014

You Should Attend If...

you are a food safety professional interested in

- Understanding and applying basic kinetics equations to various batch and continuous thermal processes with a goal of maximizing quality and ensuring safety;
- Exploring the use of various conventional and advanced thermal and non-thermal processing technologies and equipment for commercial food processing application;
- Designing thermal processes and using appropriate sensors to validate the process;
- Understanding sanitary requirements for food plants and compliance with international regulations associated with thermal processing.

Fees

The participation fees for taking the modules is as follows:

Participants from abroad : US \$500

Industry/ Research Organizations: ₹ 30000

Academic Institutions: ₹ 10000

The above fees include all instructional materials, computer use for tutorials, and 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Professor K. P. Sandeep is Research Leader and Associate Department Head in the Department of Food, Bioprocessing and Nutrition Sciences at North Carolina State University. He has been involved with the Center for Advanced Processing and Packaging Studies (CAPPS) for over 16 years and is currently the Site Director of CAPPS at NC State. Prof. Sandeep's research interests are focused around thermal processing of foods, aseptic processing of viscous and particulate foods, mathematical modeling of non-Newtonian two-phase flow and heat transfer, continuous flow microwave and radio frequency heating, enhancement of heat transfer coefficients, and development and use of sensors are his continuing research interests.



Dr. A. K. Datta is a Professor of Agricultural and Food Engineering at IIT Kharagpur. His research has focused heavily on the mathematical modeling and simulation of biofouling estimation and control in heat exchangers, energy efficient baking of health foods, aseptic processing and packaging of liquid foods, thermo-rheology of non-Newtonian liquids and theory of biomaterial drying.

Course Co-ordinator

Prof. A. K. Datta

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Advanced Technologies for Wastewater Treatment and Recycling

Overview

Water is gradually leaving the domain of an abundant natural resource to move into the domain of a commodity. Conservation of water by more efficient use, reduction of loss and recycling of wastewater after suitable treatment are the strategies adopted and promoted to varying extent all over the world. The conventional technologies are not always effective enough to treat all kinds of wastewater, especially industrial wastewater, to make it suitable for recycling for various uses. A number of advanced technologies have been developed and tested to take care of this problem. The need of the day is to make the users aware of the potential of these technologies for practical and economic applications as well as to identify the research needs to overcome the problems that still exist.

Objectives

The primary objectives of courses are as follows:

- To deal with the basic principles of advanced wastewater treatment technologies.
- To familiarize the participants with the applications potentials, present state of art about design, optimization of treatment systems and devices and to undertake case studies.
- To discuss the selection of technology for treatment of a particular type of wastewater.
- To identify the research needs to achieve the desired quality of treated water for recycling

Date

The course will be held from : **July 2 – July 15, 2014**

You Should Attend If...

- You are an executive, engineer and researcher from manufacturing, service and government organizations including R&D laboratories.
- You are a student at all levels (B.Tech/M.Sc/M.Tech/PhD) or faculty from reputed academic institutions and technical institutions.

Fees

The participation fees for taking the course are as follows:

Participants from abroad : US\$ 500

Industry/ Research Organizations : ₹ 20000

Academic Institutions: ₹ 10000

The above fee includes all instructional materials, computer usage for tutorials and assignments and 24 hours free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Ajay Kumar Ray is Professor and Chair of Department of Chemical and Biochemical Engineering, University of Western Ontario, London, Canada. His research areas are Band Engineered Photocatalysis for water purification, production of clean hydrogen fuel, self-cleaning of building surfaces, modelling, simulation and multi-objective optimization.



Madhumita B. Ray is Professor of Department of Chemical Engineering and Biochemical Engineering, University of Western Ontario, London, Canada. Her research area can be categorized in two broad areas: Advanced treatment technologies for waste treatment and environmental modelling.



Sudarsan Neogi is professor of Department of Chemical Engineering at IIT Kharagpur. His research has focused on surface modification using plasma and engineering of polymer substrates for biomedical applications, plasma enhanced chemical vapor deposition, plasma sterilization, adhesive development, antimicrobial coatings, modelling and simulation of chemical process plant and environmental pollution control.

Course Co-ordinator

Prof. Sudarsan Neogi

Department of Chemical Engineering
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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Modelling of Fluvial Processes

Overview

Fluvial processes are complex phenomena in hydrodynamics. Turbulent flow and sediment transport in rivers are interdependent and utmost important to design and predict the fluvial processes, e.g. reservoir sedimentation, aggradations and degradations of riverbed, scour/erosion, etc. The purpose of the present course is to describe both the physical and mathematical modelling in river hydrodynamics, sediment transport, and flow characteristics related to fluvial processes. This course presents a good overview of the fundamentals and as well as latest model developments in fluvial hydrodynamics. Lectures will be delivered by Internationally renowned faculties from abroad and India. Importantly, various aspects of the subject will be covered in a duration two weeks through class lectures, tutorials and experimental demonstrations.

Syllabus

Mathematical models: Immobile bed flow, sediment dynamics, fluvial processes, meandering and braiding, scour and erosion

Physical models: Synthesis of experimental and field data, dimensional system and analysis, similitude, concept of dynamic similitude for fluvial systems, immobile bed model and mobile bed model.

Modules

A: Duration of the course: June 9 - June 20, 2014
Number of participants for the course will be limited to fifty.

You Should Attend If...

This course is designed for B.Tech / M.Tech / M.Sc / PhD students of Civil Engineering, Water Resources, Geology and Geophysics, Ocean Engineering, Mining, Mathematics etc. who will be benefited to learn the experimental, analytical and computational modelling of fluvial processes. This is an excellent opportunity for the students to learn details of modelling to pursue further studies and/or research in subjects related to fluvial processes, such as sediment transport, turbulence and river hydraulics.

Fees

The participation fees for taking the modules is as follows:

Participants from abroad : US\$ 500

Industry/ Research Organizations: ₹ 20000

Academic Institutions: ₹ 5000

The above fee include all instructional materials, computer use for tutorials, 24 hrs free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Dr. Thanos Papanicolaou is a Distinguished Professor and Henry Goodrich Chair of Civil and Environmental Engineering, The University of Tennessee at Knoxville, Tennessee, USA. He is ASCE Walter Huber Award Fellow. He is the Chief Editor of the Journal of Hydraulic Engineering (ASCE) and Associate Editor of the Water Resources Research (AGU), and Journal of Sediment Research. His research interests include open channel flow, sediment transport, land scape processes, hydraulic infrastructure and instrumentation.



Dr. Asis Mazumdar is a Professor, Dean (FIS), Director of School of Water Resources Engineering, Jadavpur University, Kolkata, India. His research interests are Hydraulics and Water Resources Engineering, Environmental Hydraulics, Hydrology and Limnology, Fluid Mechanics, Climate Change and Natural Resources Management. He teaches Water Resources and Hydraulic Engineering, Fluid Mechanics and Fluid Machinery.



Dr. Subhasish Dey is a Professor and Head of the Department of Civil Engineering, Indian Institute of Technology Kharagpur. He is an Associate Editor of Journal of Hydraulic Engineering (ASCE), Journal of Hydraulic Research (IAHR), Sedimentology, Acta Geophysica, Journal of Sediment Research and Journal of Hydro-Environment Research, etc. His research interests include analytical hydrodynamics, sediment transport and turbulence.



Dr. Prashanth Reddy Hanmaiahgari is an Assistant Professor in the Department of Civil Engineering, Indian Institute of Technology Kharagpur. His research interests include experimental and numerical modeling of flow in open channels and closed conduits, turbulence, sediment transport and river morphology. He teaches open channel flow hydraulics, turbulence and sediment transport.

Course Co-ordinators

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Engineering Asset Management

Overview

In today's highly competitive business environment, management of physical assets (their selection, maintenance, inspection and renewal) plays a key role in determining operational performance and profitability of any business unit, manufacturing plant or industry that operate assets as a part of their core business. Asset Management, being the art and science of making right decisions and optimizing these processes, attempts to minimize the total life cost of assets and directly or indirectly influences manufacturing/production/operation/service cost, processes and quality, and throughput or delivery time.

Asset Management for any engineering system needs to focus on maintenance, renewal and enhancement activities, with an integrating mechanism, on delivering sustainable outputs valued by customers and funding providers at the lowest whole-life cost emphasizing on creating knowledge of how assets degrade and fail to optimize maintenance and renewal interventions. It is essential that industries across India, many organizations of which being asset-intensive, promote a consistent asset management approach to their infrastructures and systems in overall manufacturing, production and supply chain domain to develop their own methods, standards and framework for achieving excellence in business performance.

Although industries, in general, are aware of the potential of Asset Management for achieving excellent and all-out organizational performance, a well-trained group of personnel cutting across different functions and departments of any organization is a prime necessity. The 2-week duration Industrial Summer/Winter Term (ISWT) on 'Engineering Asset Management will provide both industry professionals and students/researchers with valuable insights into several pertinent issues required for successful planning, modeling and implementation of Asset Management of Engineering Systems. Internationally acclaimed academics, researchers and practitioners with proven knowledge, experience, and demonstrable ability in teaching, consultancy, research, and training in the field of Engineering Asset Management will deliver lectures and discuss cases in the course. Course Content

Pertinent Issues of Asset Management in Indian industries, Life Cycle Cost Analysis for Asset Management, ISO 55000 Standards: Recent Trends in Asset Management, Failure Mode and Effects Analysis for Specific Assets, Application of Lean Engineering Principles for Asset Management, Asset Design and Maintenance Issues. 3 contact hours per day for a period of 2 weeks (10 working days). The methods consist of lecture sessions, hands-on-exercises, discussions on cases, and live problems.

Dates

June 9 - June 20, 2014

Number of participants for the course will be limited to fifty.

You Should Attend If...

- Executives, engineers and researchers from manufacturing, service and government organizations including R&D units research laboratories, and technical institutions.
- It is suggested that students at all levels (B.Tech/M.Sc/M.Tech/PhD) take this subject to earn credits for this subject.

Fees

The participation fees for taking the modules is as follows:

Participants from abroad : US\$ 500

Industry/ Research Organizations: ₹ 20000

Academic Institutions: ₹ 10000

The above fee include all instructional materials, computer use for tutorials, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Prof. Gopinath Chattopadhyay is Principal Consultant, Asset Management in Cardno since May 2012. He is adjunct professor of school of engineering and technology in CQ University, Australia. He was Professor of Asset Management and Head of Engineering Post Graduate Programs in recent past at CQ UNIVERSITY Australia. He has over 16 years of Experience in industries and 18 years of experience in Universities such as University of Queensland, Queensland University of Technology, University of Calcutta, Indian Institute of Technology Kharagpur in India, University of Indonesia, Saarland University in Germany and Lulea University of Technology in Sweden. He has worked in IT systems, materials planning, production planning, project management, reliability, operations management and maintenance management. Professor Chattopadhyay is a member of Editorial Boards of several reputed International Journal.



Prof. Pradip K. Ray is presently a Professor in the Department of Industrial and Systems Engineering, Indian Institute of Technology (IIT), Kharagpur, India. He served as the Head of the Department during September, 2006 to August, 2009. Professor Ray has about more than thirty three years of diversified experience-eight years as Senior Industrial Engineer/Manager at General Electric Company of India in Calcutta and twenty five years of teaching and research experience at IIT, Kharagpur. He has published one text book titled 'Product and Process Design for Quality Economy and Reliability', four book chapters, and around 120 papers in international and national journals of repute and conferences in the areas of productivity measurement and evaluation, quality design and control, TQM, process optimization, ergonomics/human factors engineering, safety engineering and management and other related topics. He has supervised 16 PhD scholars in his research areas till date. Professor Ray is a certified Lead Assessor for ISO-9001 registration, and actively involved in a number of industrial consulting and research projects (23 such projects till date) in his interest areas. He is a member of several professional bodies, such as INFORMS and IIMM, and a Fellow of World Academy of Productivity Sciences and a Fellow of Institution of Engineers (India).



Prof. Biswajit Mahanty is a professor at the department of Industrial and Systems Engineering (erstwhile Dept. of Industrial Engg. and Management) at IIT Kharagpur. He has obtained his B.Tech (Hons) degree in Mechanical Engineering, and his M.Tech and Ph.D. degrees in Industrial Engineering and Management—all from IIT Kharagpur. Professor Mahanty has had a rich and varied professional career with over six years of industrial experience and 23 years of teaching, research, and industrial consulting work experience. His areas of interest are in Operations Research, Systems, Operations Management, and Information Systems. Professor Mahanty has guided 11 doctoral and about 100 undergraduate and post-graduate level dissertations. He has also carried out 16 industrial consulting projects and five sponsored

research projects. He has, to his credit, 80 publications in national and international journals and conferences of repute. He is also an author of the book "Responsive Supply Chain" published by the prestigious CRC press. He has developed a 29-lecture NPTEL course on Management Information System. He has also taught in the School of Management at AIT, Bangkok as a visiting faculty member.

Course Co-ordinators

Professor Pradip Kumar Ray

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Advanced Plasma Processing: Fundamentals and Applications

Overview

Plasmas constitute more than 99% of the universe visible to us. Plasma consists of ions, electrons, neutral particles and the excited species. It is considered as the fourth state of matter. It can be described based on degree of ionization, density and by thermodynamic equilibriums. On the basis of relative temperature between ion, electron and neutral species, plasmas are classified as thermal or non-thermal equilibrium plasma. Plasma application is gaining increasing importance as an effective, inexpensive and environmentally friendly process for various industrial applications.

Objectives

The primary objectives of courses are as follows:

- To deal with thermal and non-thermal plasma technologies, their theories, fundamentals, present and potential applications.
- To discuss the advanced and extremely value added industrial applications of RF plasma such as in the field of optical fibers, semiconductors, optical sensors and also surface engineering.
- Gaining an insight into inductively coupled thermal plasma and its wide scale applications in the field of Plasma Spraying.

Date

The course will be held from: **June 16 – June 27, 2014**

You Should Attend If...

- You are an executive, engineer and researcher from manufacturing, service and government organizations including R&D laboratories.
- You are a student at all levels (B.Tech/M.Sc/M.Tech/PhD) or faculty from reputed academic institutions and technical institutions.

Fees

The participation fees for taking the course are as follows:

Participants from abroad : US\$ 500

Industry/ Research Organizations : ₹ 20000

Academic Institutions: ₹ 10000

The above fee includes all instructional materials, computer usage for tutorials and assignments and 24 hours free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Maher I. Boulos is Chief Technology Officer CTO, Tekna Plasma Systems and Tekna Advanced Materials, Inc. Sherbrooke, Québec, Canada. He is also an Emeritus Professor of Department of Chemical Engineering, University of Sherbrooke, Québec Canada. Over his 35 years career at the University of Sherbrooke, professor boulos principal research activity was in the area of thermal plasma technology, mathematical modelling, plasma diagnostics and plasma process developments.



S. Neogi is professor of Department of Chemical Engineering at IIT Kharagpur. His research has focused on surface modification using plasma and engineering of polymer substrates for biomedical applications, plasma enhanced chemical vapor deposition, plasma sterilization, adhesive development, antimicrobial coatings, modelling and simulation of chemical process plant and environmental pollution control.

Course Co-ordinator

Prof. Sudarsan Neogi

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Advanced Formal Techniques in Design, Verification and Testing of Digital Integrated Circuits

Overview

The intent of this course is to provide an exposition of the advances that have taken place over the last decade on the use of symbolic logic and decision procedures in digital circuit design, validation and test. The first part of the course will introduce the new types of decision procedures that have led to significant benefits in the design and verification of complex integrated circuits. This will include symbolic representations such as Binary Decision Diagrams (BDD) and Boolean Satisfiability (SAT), and their more recent extensions, such as Word Level Decision Diagrams, Symmetric Modulo Theory (SMT), Linear Interpolants, etc. The second part of the course will cover recent advances in formal verification. This module will start by recalling the background of traditional model checking techniques for propositional temporal logic and its industrial extensions like PSL and SVA. This will be followed with an exposition of more recent developments such as bounded model checking, abstraction-refinement and design intent coverage. The third part of this course will dwell on the use of symbolic logic and decision procedures in digital testing, fault debugging and repair. One of the important and emerging areas where formal techniques have been successfully applied is reversible computation. The fourth and final part of this course will focus on this topic and it will be shown how decision diagrams play a very important role in the modeling and synthesis of reversible circuit netlists.

Course participants will address these topics through lectures and extensive hands-on workshops and assignments using synthesis and optimization tools.

Dates

June 16 - June 27, 2014

Number of participants for the course will be limited to fifty.

You Should Attend If...

- you are a practicing engineer interested to know about formal techniques and their applications in digital circuit design and testing; or
- you are a student or faculty from an academic institution interested to learn about this field, and possibly take it up as a research challenge in the future.

Fees

The participation fees for taking the course module is as follows:

Participants from abroad : US \$300

Industry/ Research Organizations: ₹ 14000

Academic Institutions in India: ₹ 8000

The above fee includes all instructional materials, laboratory use for tutorials, 24 hr free internet facility. The participants may be provided with accommodation on payment basis.

The Faculty



Rolf Drechsler is a Professor at the University of Bremen, Germany, and the Head of the Group for Computer Architecture, Institute of Computer Science. Since 2011, he is also the Director of the Cyber-Physical Systems group at the German Research Center for Artificial Intelligence (DFKI) in Bremen. His current research interests include the development and design of data structures and algorithms with a focus on circuit and system design.



Supratik Chakraborty was a president's gold medalist from IIT Kharagpur, and is presently a Professor in the Department of Computer Science and Engineering at IIT Bombay. His research interests include formal methods for analysis and verification, automata and finite model theory, and design and analysis of asynchronous systems.



Indranil Sen Gupta is a Professor of Computer Science and Engineering, and the Managing Director, Science and Technology Entrepreneur's Park, at IIT Kharagpur. His research interests include reversible computing, VLSI design and testing, and information security.



Pallab Dasgupta is a Professor of Computer Science and Engineering and the Associate Dean of Sponsored Research at IIT Kharagpur. His research interests include formal verification, electronic design automation, and artificial intelligence. He is a Fellow of the Indian National Academy of Engineering.

Course Co-ordinator

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Microwave Imaging

Overview

Microwave imaging is a technique for capturing a scene by illuminating it with microwave. Recently it has proved itself useful in providing excellent diagnostic capabilities in several important areas, including civil and industrial engineering, nondestructive testing (NDT), geophysical prospecting and biomedical Engineering. The course on Microwave Imaging aims to take a step forward to unravel the mysteries of this fascinating technology.

This course is organized in two modules that should be taken together. Module A topics are so chosen that participants get exposed to the basic understanding of Microwave Imaging. They include Electromagnetic Inverse Scattering, Regularisation Theory for solving non-linear problems, Engineering Model of Imaging Systems, Image Reconstruction paradigm and Hardware requirement for Microwave Tomography. In Module B various application areas of Microwave Imaging like Medical Diagnostics, Stealth Design and control, Shallow subsurface Imaging, Non-destructive Testing and Fault Diagnosis, Subsurface armanent Detection and Remote Radar Imaging would be emphasized and their core technical challenges pinpointed.

Course participants will learn these topics through lectures and tutorials. Also case studies and assignments will be shared to stimulate research interest of participants.

Modules

A: Foundation of Microwave Imaging : June 16 - June 21
B: Applications of Microwave Imaging : June 23 - June 27
Number of participants for the course will be limited to fifty.

You Should Attend If...

- you are an electronics engineer/research scientist interested in designing a microwave camera and/or process microwave images for engineering applications.
- you are stealth system designer, internal security technologist, medical diagnostic or NDT engineer interested to apply microwave imaging to your respective field.
- you are a student or faculty from an academic institution interested in learning the research methodology on Microwave Imaging or want to analyse microwave images for detection or concealment of targets in air, water or ground.

Fees

The participation fee for taking the course is as follows:

Participants from abroad : US \$500

Industry / Research Organizations: ₹ 30000

Academic Institutions: ₹ 10000

The above fee includes all instructional materials, computer usage for tutorials and assignments and 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Magda El-Shenawee is a Professor of Department of Electrical Engineering, University of Arkansas. Her research has centred around terahertz imaging and spectroscopy for medical and defense applications, microwave imaging for breast cancer detection, development of computational inverse scattering algorithms, development of MEMS and plasmonic nano-antennas for solar applications and subsurface sensing of buried objects.



Anjali Bhatia is a senior scientist of Defence Laboratory, Jodhpur. Her pioneering work has led DRDO to install Microwave Imaging systems for stealth evaluations and Radar Cross-Section Measurements. She also worked on the atmospheric radar front-end development and radar signal-processing.



Dr. Amitabha Bhattacharya is an Associate Professor of Indian Institute of Technology, Kharagpur. His research interest is Microwave Imaging, High Power Microwaves and Time Domain Electromagnetics.

Course Co-ordinator

Prof. A. Bhattacharya

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Geospatial Technologies in Hydrological Modeling

Overview

Land and water are the two basic natural resources, which must be conserved as carefully as possible. The deterioration of natural resources in an area can be contained effectively by adopting the systems approach at the watershed scale. An accurate understanding of the hydrological behaviour of a watershed is important for effective watershed management. Watershed being a dynamic unit, its behaviour varies both spatially and temporally. Several hydrological models ranging from empirical to physically based distributed parameters have been developed in the past to study the hydrologic behaviour of a watershed at different time and spatial scales. However, the compilation and input of hydrologic data that are required by distributed hydrologic models are often cumbersome. The tediousness and time consuming nature of extraction of watershed parameters can be eliminated by means of Geospatial technologies which include Remote Sensing Technology (RST), Geographic Information System (GIS), and Global Positioning System (System). With the recent advancement in geospatial technologies and computing power, the distributed hydrologic models are now being widely used for a number studies, which include rainfall-runoff transformation, flood forecasting and control, water resources planning, reservoir sedimentation, climate change impact etc. However, application of these technologies in hydrology is still very limited in our country due to lack of trained manpower. Keeping this in view, a course on Geospatial technologies with an emphasis on hydrological modeling is designed for undergraduate and postgraduate students, academicians, field practitioners and planners.

Internationally acclaimed faculties with vast experience in teaching and research in the field of Geoinformatics and Hydrology will deliver lectures and present case studies in the course. The course will be planned and offered as per the norms set by IIT Kharagpur for ISWT subject.

Dates

The course will be held from **June 16 - June 27, 2014**
Number of participants for the course will be limited to fifty.

You Should Attend If...

- you are a field engineer, researcher, and planner interested in obtaining improved solutions for natural resources management using geospatial technologies.
- you are a student or faculty from academic institution interested in learning various geospatial technologies such remote sensing, geographical information system (GIS), global positioning system (GPS) and their application in hydrological modeling.

Fees

The participation fees for taking the course is as follows:

Overseas Participants : US \$500

Industry/ Research Organizations : ₹ 10000

Academic Institutions: ₹ 5000

The above fee include all instructional materials, computer use for tutorials, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Dr. Venkat Sridhar is Assistant Professor in the Department of Biological Systems Engineering at Virginia Polytechnic Institute and State University. Dr. Sridhar conducts modeling research to understand the impact of climate change on hydrology and water resources using models, GIS and remote sensing techniques. Dr. Sridhar has published over 30 peer-reviewed articles in leading international journals including Science. He is a Registered Professional Engineer in Idaho and Nebraska and a member of ASCE, AMS, AWRA, AGU and AAAS.



Dr. Vimal Mishra is Assistant Professor in Civil Engineering and Varahmihir Earth Science Research Fellow at Indian Institute of Technology (IIT) Gandhinagar. His research focuses on land surface hydrology, climate variability, climate change, and extreme events. He has published in top quality journals and his research was highlighted in Science and Nature magazines. He has been awarded prestigious fellowships such as Lynn Graduate Fellowship (Purdue University), Max Plank Fellowship (International Max Plank Society), and JSPS Fellowship.



Dr. Chandranath Chatterjee is an Associate Professor in Agricultural and Food Engineering Department at IIT Kharagpur. His research interests include flood modeling, hydrological modeling and application of Geo-informatics in surface water hydrology. He has supervised 2 PhD and 33 postgraduate students and has published 45 peer reviewed papers. He has received several awards including the Alexander von Humboldt Foundation award from Germany.



Professor N. S. Raghuvanshi is Professor in Agricultural and Food Engineering Department at IIT Kharagpur. His research focuses on application of geospatial technologies in watershed management, irrigation system management, application of soft computing in hydrology and development of education and design software. He is recipient of Rotary International Fellowship, Fulbright-Nehru Senior Research Fellowship and Dr. P. S. Kankhoje Memorial Gold Medal. He has supervised 10 Ph.D. and 52 Master thesis and has published 91 peer reviewed papers.

Course Co-ordinators

Professor N. S. Raghuvanshi

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Numerical Ocean Modeling

Overview

This course will appeal to those who wish to understand the dynamics of a scientifically challenging and important field such as oceanography. The training provided will be invaluable for the effective and intelligent use of mathematical and numerical models in the sciences and will be equally useful for those preparing to enter industry, research or to study for a higher degree.

Internationally acclaimed scientists, with proven knowledge, experience, and demonstrable ability in teaching, consultancy, research, and training in the field of oceanography will deliver lectures and discuss various aspects of ocean monitoring and modeling cases in the course. The course will be planned and offered as per the norms set by IIT Kharagpur for ISWT subject.

The course will be taught in two modules: module 1 covers the observational and mathematical modeling aspects of natural hazards, and module 2 will talk about the observed circulation features in the North Indian Ocean and how to model the same.

Dates

June 16 - June 28, 2014

Courses

Module 1: Observational and modeling aspects of natural hazards
Module 2: Modeling of ocean circulation

You Should Attend If...

- Executives, engineers and researchers from service and government organizations including R&D laboratories.
- Students at all levels (B.Tech./M.Sc./M.Tech./PhD) Or Faculty from reputed academic institutions and technical institutions.

It is advised to take both modules together. Number of participants for the course is limited to fifty (50) only.

Fees

The participation fees for taking the modules is as follows:

Participants from abroad : US \$500

Industry/ Research Organizations: Only one module: ₹ 10000, Both modules: ₹ 15000

Academic Institutions: Both modules ₹ 5000

The above fee includes all instructional materials, computer use for tutorials, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Prof. Tad Murty is an eminent international expert in the field of natural hazards and climate change. Currently he is an Adjunct Professor, Department of Civil Engineering, University of Ottawa, Canada. He has recently retired from the Canadian Oceanographic Service as a Senior Research Scientist (retired at level 5, the highest possible level in Canada, and is achieved by less than one percent of the scientists in Canada). Previously, Prof. Tad Murty also served in various positions such as the Director of the National Tidal Facility of Australia and Professor of Earth Sciences, Flinders University, Adelaide, Australia. He published more than 550 papers, of which about 380 are in peer reviewed international journals. He has authored, co-authored and edited 14 books and monographs. Received several national and international awards for original outstanding research contributions. He is a resource person for dozens of international conferences and workshops, did scientific missions and projects world wide in more than 40 countries, on all continents including Antarctica. He is consultant to various organizations of the United nations and to several governments. He Served on many international committees and commissions - Past Chairman of the Tsunami Commission of the United Nations and edited the Storm Surge Manual for the World Meteorological Organization in Geneva. Currently he is the Editor-in-Chief, Natural Hazards (an international scientific journal published by the Springer) and Senior Associate editor, Marine Geodesy (an international scientific journal published by the Taylor & Francis). He is the Vice -President, International Tsunami Society, Honolulu, Chairman of the Scientific Audit Committee and also member of the Expert Advisory Group, Kalpasar Project, Government of Gujarat and Visiting Scientist, Beijing Institute of Technology, Beijing, China.



Dr. D. Shankar is an eminent international expert in the field of tropical ocean dynamics. Currently he is a senior scientist and Professor in AcSIR School of Oceanography in the National Institute of Oceanography, Goa, India. He has about 46 papers in peer reviewed international journals. He serves as the Editor-in-Chief of Journal of earth System Science. He has been honoured with several prestigious awards such as CSIR Young Scientist (2002), SCOPUS Young Scientist Award (Elsevier, India, 2006), Fellow (Indian Academy of Sciences, Bangalore, 2011), Shanti Swarup Bhatnagar Award (2011) and Fellow (National Academy of Sciences, India, 2011).



Dr. C. Shaji is an Assistant Professor in the Centre for Oceans, Rivers, Atmosphere and Land Sciences (CORAL), IIT Kharagpur. His teaching and research interests include ocean dynamics, coastal processes and climate variations.

He has authored several articles in journals of repute. He is recipient of several prestigious research fellowships including Science and Technology Agency fellowship of Japan, and UCAR Visiting Scientist fellowship of USA.

Course Co-ordinator

Dr. C. Shaji

Principal Coordinator

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Biofuels: Policy and Law

Overview

This course on Biofuel policy and law provides participants with an interdisciplinary focus on the multiple considerations of implementing biofuel technology from a technical, legal and social perspective through the maximization of the information package and critical consumption of law and practice. A combination of lectures, interactive exercises, assignments, case studies will form the method of teaching-learning. Student will learn about the different biofuel options, their production and analysis methods, policy influences on biofuel use and development, legal perspective, standards and regulation, sustainability issues.

Internationally acclaimed academics, researchers and practitioners with proven knowledge, experience, and demonstrable ability in teaching, consultancy, research, and training will deliver lectures and discuss cases in the course. The course may facilitate one visit to a biofuel industry to enable students to practically understand techno-legal requirements related to manufacturing, compliance requirements and marketing of biofuels.

Goals

The course will equip students to critically examine and understand

- the ongoing scientific and policy and implementation of legislation in relation to biofuels.
- the interdisciplinary aspects of policy, technology and socio-economic and legal considerations in the introduction and commercialization of biofuels worldwide.

Modules

A: Bioenergy Technology & Environmental/Social Impacts	:	June 23 - 27, 2014
B: Biofuels Policy, Innovation and Politics	:	June 30 - July 4, 2014
Number of participants for the course will be limited to fifty.		

You Should Attend If...

- You are an executive, engineers or researcher from manufacturing, service and government organizations including R&D laboratories.
- You are a students at any level (B.Tech/M.Sc/M.Tech/PhD) or faculty from reputed academic institutions and technical institutions.

Fees

The participation fees for taking the modules is as follows:

Participants from abroad : US \$500

Industry/ Research Organizations: ₹ 20000

Academic Institutions: ₹ 10000

International Students US \$100 | Indian Students: ₹ 2500

The above fee include all instructional materials, computer use for tutorials, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty

The name of the International Faculty will be announced in the website as and when the confirmation from the faculty is received.



Dr. M. Padmavati has nine years research experience in flavonoid metabolism in rice and maize and four and half year industry experience in genome knowledge curation and filing of invention disclosures. She worked as a Senior Scientist and Project coordinator at Monsanto Research Center, Bangalore. She also worked as a Senior Scientist for Ocimum Biosolutions in the area of bioinformatics.

Her current research interests are in agricultural biotechnology, IP and commercialisation of recombinant and herbal drugs and bioenergy technologies, drug pricing mechanisms and regulation. At IIT Kharagpur she is an Associate Professor in the Rajiv Gandhi School of IP Law where she teaches Intellectual Property Law, Patent law, Biodiversity law and IP Management. She has been awarded the Microsoft Outstanding Young Faculty Scholarship. She received her Ph.D in Plant Sciences from the University of Hyderabad and also holds a Master Degree in IP.

She is a member of the International Patent User Group (PIUG), Biotechnology Research Society of India (BRSI), Biotechnology Consortium of India Ltd (BCIL) and is a Scientific Committee member of the Food Safety Standards Authority of India. She has publications in the area of biotechnology and intellectual property. She has authored book chapters on bioinformatics and biotechnology and has patents in the area of gene manipulation.

Course Co-ordinator

Prof. Saikat Chakraborty

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Distortion Prediction and Control of Large Ship Structural Units

Overview

Ships designed for high speed operation are generally weight sensitive and calls for thin plates and sections. The increased use of thin plates in panel fabrication results in significantly increased distortion. The net result is increased man-hours for fitting, flame straightening and rework. Thin materials have less inherent ability to resist the welding induced stresses. Consequently, severe distortions have emerged as a major obstacle to cost-effective fabrication of such complex vessels. Therefore, in-process control of welding distortion is more desirable than post welding rectification from the point of manufacturing efficiency. To effectively combat this problem of weld induced distortion, the ship structural designers should be equipped with necessary knowledge of the mechanism of welding deformation. They should also have necessary design analysis tools to evaluate a given design from distortion point of view as well. At the same time the shop floor production engineers should be able to implement the right kind of fabrication procedure with proper welding sequence and distortion control measures. This course identifies the factors affecting distortion and provides guidance to designers and shop floor engineers on practical approaches of controlling weld induced distortions in ship structures.

The syllabus will include: Types of distortion, factors affecting distortion, distortion control through appropriate design and fabrication techniques, distortion control through thermo mechanical tensioning, methods for correcting distortion, numerical methods for computational mechanics, measurement of 3D welding residual stresses, material and damage models for ultra-high strength steels and metal forming simulation, accuracy control.

Objectives

On completion of the course one should be able to apply a sound knowledge of various technologies for controlling distortions in ship structures.

Dates	June 30 to July 11, 2014
You Should Attend If...	Ship structural designers, shop floor engineers, applied scientists, technologists, students at all levels (B.Tech/M.Tech/PhD) and faculty from reputed academic institutions interested in weld induced distortions of large ship structures and their control measures. Number of participants for the course will be limited to fifty.
Venue	Dept. of Ocean Engineering and Naval Architecture, IIT Kharagpur, India
Fees	<p>Overseas Participants : US \$500 Industry/ Research Organizations : ₹ 30000 Academic Institutions: ₹ 10000</p> <p>The above fee include all instructional materials, Lab exercises and 24 hr free internet facility. The participants will be provided with accommodation in our in-campus guest house on payment basis.</p>

The Faculty



Dr. Hidekazu Murakawa is a Professor in the Department of Mathematical Modeling and Computational Analysis in the Joining and Welding Research Institute, Osaka University, Japan. He is an acclaimed researcher in the field of welding technology and computational weld mechanics. His fundamental areas of research and education are the mathematical modelings of various phenomena involved in the joining & welding and their application to industrial problems. He has authored several research papers and five books on welding technology and weld distortion analysis.



Dr. Ninshu Ma is an invited Professor at the Research Center for Computational Welding Science (CCWS), Joining and Welding Research Institute, Osaka University. Prof. Ma has developed a commercial software named JSATMP for metal forming simulation and a commercial software titled JWELD for welding simulation. He has proposed several material models for strength evaluation and metal forming. He has published several papers in journals and international conferences in the area of metal forming and computational welding mechanics. Prof. Ma has published three books in English, Chinese and Japanese, and has 7 Japan patents to his credit.



Dr. O. P. Sha is a Professor in the Department of Ocean Engineering and Naval Architecture, IIT Kharagpur. He teaches a wide variety of subjects at the Institute and his main areas of interest include ship design and production, CAD/CAM and high performance vehicles. He is involved in a number of sponsored research and industrial consultancy projects.



Dr. Nisith R. Mandal is a Professor in the Department of Ocean Engineering and Naval Architecture, IIT Kharagpur. He is actively engaged in teaching and research in the field of welding techniques, distortion control and line heating as applied in ship building. He has undertaken several industrial consultancy as well as research projects in his area of expertise sponsored by various private and government agencies. He has published several research papers in journals and conferences. He has also authored three books on welding and distortion control and aluminium welding.

Course Co-ordinators

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

On-site Wastewater Treatment and Management

Overview

By 2025, nearly 48% of the world population is projected to be living in regions considered to be water-stressed. Fresh water demand is increasing alarmingly around the world and urgent measures to carefully manage existing water resources are required. Important case in point is related to groundwater sources, which are used both for agricultural irrigation and drinking water purposes. Over-exploitation of groundwater is threatening both the available quantity and water quality of this important water resource. In general, globally there is an imbalance between groundwater recharge and consumption. The resulting groundwater quality impairment will limit its end-use applications. Issues related to greenhouse gas emissions and energy resources dominate mass media, but water resource concerns are not far behind.

The proposed course will guide the students in managing wastewater on-site and protecting water resources in sustainable manner. On-site wastewater treatment is required as it is not feasible to “sewer” entire community, specifically sewer development in remote locations. Effective on-site wastewater treatment/management is not only considered practical but also critical to maintain to overall water/environmental quality. Proper design and management of onsite systems are important components of wastewater management. Society has not accepted that responsibility yet, so engineers have to convince the public of its necessity (and functionality). In this course, the engineers learn the need to install systems that meet the environmental and health impacts, but yet acceptable to the public. All problem sets will be based on real world designs and will use the principles of the various components of an onsite system to select and size the appropriate components for the site. Instructors discuss pro and cons of design.

Dates	June 30 - July 11, 2014
You Should Attend If...	<ul style="list-style-type: none"> Engineers & researchers, research/project consultants from manufacturing, service and government organizations including R&D laboratories. Students at all levels (B.Tech/M.Sc/M.Tech/PhD) or Faculty from reputed academic institutions and technical institutions.
Fees	<p>The participation fees for taking the modules is as follows:</p> <p>Participants from abroad : US \$500</p> <p>Industry / Research Organizations: ₹ 30000</p> <p>Academic Institutions: ₹ 10000</p> <p>The above fee includes all instructional materials, computer use for tutorials, 24-hr free internet facility. The participants will be provided with accommodation on payment basis.</p>

The Faculty



Prof. K. G. Karthikeyan is a Professor of Biological Systems Engineering at University of Wisconsin-Madison. Karthikeyan's expertise is in the areas of water quality engineering, environmental fate and transport of contaminants, land application of municipal and agricultural waste, advanced water treatment technologies, and wastewater treatment and reuse. His research activities, over the past 22 years, have focused on the development and assessment of various management practices intended to minimize water quality impacts of agricultural/animal production activities and municipal wastewater disposal. Karthikeyan's research has enabled finding creative solutions for environmental problems related to sediments and associated contaminants. He has worked on several diverse multidisciplinary projects (USDA, USEPA, USGS, USDOE, Qatar Foundation, State of Wisconsin DNR), of significant breadth and complexity, as the lead or a major investigator.



Dr. D. R. Mailapalli is an Assistant Professor of Land and Water Resources Engineering, Agricultural and Food Engineering Department, IIT Kharagpur. His research interests are in non-point source pollution, agricultural water and waste management, irrigation hydrology and hydraulics, sediment and nutrients transport, cold region hydrology. He has worked with researchers from the U.S. universities and industries as well during his postdoctoral study. Dr. Mailapalli is one of the Editorial Board Members of the Journal of Water Resources and Protection. He has published more than 23 research articles and 12 conference papers, and volunteered as a reviewer for more than 20 research journals. He acquired \$200,000 grant money through various research projects during his postdoctoral research at University of California- Davis and University of Wisconsin-Madison.



Dr. Ashok Mishra is an Associate Professor of Land & Water Resources Engineering at the Department of Agricultural and Food Engineering at IIT Kharagpur. His teaching and research areas comprise of hydrological modelling & watershed management, crop yield modeling, climate change analysis & its' applications in water and crop management. His research has focused mainly on water and crop resources assessment and developing climate change adaptation techniques to manage these two.

Course Co-ordinators

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Big Data Analytics

Overview

Big data are comprised of large and complex data sets that are difficult to process using traditional database management tools or data processing applications. The big data challenges include capture, storage, search, sharing, transfer, analysis, and visualization. Therefore, in the recent years, big data analytics has received wide attention by technical and business fraternity. Big data analytics can process huge amounts of data to uncover hidden patterns, correlations, and other useful information. The technologies associated with big data analytics include NoSQL databases, Hadoop, and MapReduce. This course will cover various technical aspects of big data analytics, including its applications in the business environment. The course will focus on various data-mining algorithms that can capture, analyze, and visualize the big data. A hands-on training of parallel algorithms, which can process very large amounts of data, will be given in Hadoop, MapReduce, and NoSQL database environment. The course will allow the student to understand, use, and build practical big data analytic systems by providing a balanced view of "theory" and "practice". It will provide:

- A basic understanding of the issues and problems involved in massive on-line repository systems
- An insight of currently used techniques that satisfy the needs of such massive on-line systems
- An indication of the current research approaches, which are likely to be a basis for future solutions
- An understanding of the potential strategic and competitive advantages offered to existing businesses and other entrepreneurial opportunities

Course Schedule	<p>A: Technology for big data analytics : June 30 - July 04, 2014</p> <p>B: Business applications of big data analytics : July 07 - July 11, 2014</p>
You Should Attend If...	<p>Number of participants for the course will be limited to fifty on a first-come first-serve basis. The course is designed for you, if you are</p> <ul style="list-style-type: none"> ▪ an entrepreneur or to-be-entrepreneur who wants to learn the innovative applications of big data analytics in the ever-changing business landscape, or ▪ a student or faculty from academic institution interested in learning how to make use of big data analytics tools to derive the hidden information from big data, or ▪ a practitioner who wants to explore the potential role of big data analytics to tackle complex business problems that arise in your industry.
Fees	<p>The participation fees for taking the modules is as follows:</p> <p>Participants from abroad : US\$ 500</p> <p>Industry/ Research Organizations/Student: ₹ 30000</p> <p>Academic Institutions: ₹ 10000</p> <p>The fees include all instructional materials, computer use for tutorials, and 24x7 internet facility. Accommodation can be provided to the participant on request and payment basis.</p>

The Faculty



Prof. I. J. Chiang is an Associate Professor at Graduate Institute of Biomedical Informatics, Taipei Medical University and Adjunct Professor at Institute of Biomedical Engineering, National Taiwan University. Previously, he served as a Director, NewEgg Lab. His research interests include medical informatics, soft computing, machine learning, robotics, artificial intelligence, and data mining.



Dr. Uttam Kumar Sarkar, a Professor at the Management Information System Group of Indian Institute of Management Calcutta, had obtained his B.Tech, M.Tech, and Ph.D. in Computer Science and Engineering from Indian Institute of Technology Kharagpur. He had earlier served as a senior member in a design automation company, as a faculty member of Indian Institute of Technology Delhi, and as a Visiting Faculty at the University of Miami, Coral Gables, Florida, USA. His current research interests include Business Data Mining and Social Network Analysis.



Prof. Sourangshu Bhattacharya is an Assistant Professor in the Department of Computer Science and Engineering Institute of Technology Kharagpur. Earlier, he worked as a Scientist at Yahoo! Labs, India. His research interests include machine learning and optimization, bioinformatics, computer vision, and text mining, and natural language processing.



Prof. Ram Babu Roy is an Assistant Professor in the Rajendra Mishra School of Engineering Entrepreneurship at Indian Institute of Technology Kharagpur. He has worked as a Scientist in Defense Research and Development Organization (DRDO). His research interests include modeling and analysis of complex networked systems, business intelligence and healthcare operations management.

Course Co-ordinator

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Hydrology and Climate Change

Overview

This course is designed to integrate two major aspects of water resources management - **hydrology and climate change**. The hydrology component of the course covers the topics on elements of hydrological modeling, precipitation analysis, watershed models for rainfall-runoff modeling, hydrologic extremes, and application of entropy theory in hydrologic modeling. The climate change component includes the learning the difference between climate change and climate variability, climate change projections, impact of climate change on water resources, and climate change adaptation and mitigation.

The course focuses on developing the managerial understanding of hydrological processes and climate change fundamentals to analyse the impact of changing climate on water resources, and to develop and implement adaptive water resources policies. The course will include lectures, tutorials to solve practical problems, and demonstration of watershed/climate computer models. Participants will be exposed to recently developed techniques of hydrological analyses and integration of hydrological modeling tools with the climate change models/information.

Dates

July 01 – July 11, 2014

Number of participants for the course will be limited to fifty.

You Should Attend If...

- you are a practicing engineer, resources manager working for water resources assessment and management, and interested in understanding the hydrologic processes, climate change and their interaction for sustainable water resources management.
- you are a student or faculty in an academic institution and interested in learning hydrologic processes, hydrological modeling, climate change and its effect on water resources to handle the practical problems of water resources for sustainable use through advanced computational tools and techniques.

Fees

The participation fees for taking the course is as follows:

Participants from abroad : US\$ 300

Researchers from Industry/ Research Organizations : ₹ 10000

Students from Academic Institutions : ₹ 5000

The above fee includes all instructional materials, computer use for tutorials, and 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Prof. V. P. Singh is Distinguished Professor and Caroline & William N. Lehrer Distinguished Chair in Water Engineering, Department of Biological and Agricultural Engineering, and Zachry Department of Civil Engineering, Texas A & M University, College Station, Texas. His research interests include Surface-water Hydrology, Groundwater Hydrology, Hydraulics, Irrigation Engineering, Environmental Quality and Water Resources, and Hydrologic Impacts of Climate Change. His professional heights include 700 papers published in refereed journals, 21 books, 54 edited books and many more book chapters and special issue journals. He is editor of many Journals. He has been awarded *2012 Texas A & M University Bush Excellence Award for Faculty in International Research; University Distinguished Professor Award 2013, Texas A & M University, 2013; and Lifetime Achievement Award, Environmental and Water Resources Institute, American Society of Civil Engineers.*



Dr. S. K. Jain has research, development and teaching experience of nearly 30 years in the field of water resources. He is a scientist at the National Institute of Hydrology, Roorkee, India, and has served as Visiting Professor at the Louisiana State University, USA for one year, and NEEPCO Chair Professor at IIT Roorkee for three years. His research interests include Surface Water Hydrology, Water Resources Planning and Management, Hydropower, and Impact of Climate Change. Dr. Jain has co-authored four books, published 210 papers in Journals and conferences, edited five books, and wrote about 20 book-chapters and articles in Encyclopedias. He is a member of International Board of Advisors of the Journal of Hydrologic Engineering, ASCE, and member of the Editorial Board of the Hydrological Processes Journal (Wiley-Blackwell).



Prof. R. Singh is a Professor of Land & Water Resources Engineering at the Department of Agricultural and Food Engineering at IIT Kharagpur. His teaching and research areas comprise of hydrologic modeling and water resources management. His research has focused heavily on the development of hydrologic model, watershed management, and management of water resources.



Dr. Ashok Mishra is an Associate Professor of Land & Water Resources Engineering at the Department of Agricultural and Food Engineering at IIT Kharagpur. His teaching and research areas comprise of hydrological modelling & watershed management, crop yield modeling, climate change analysis & its' applications in water and crop management. His research has focused mainly on water and crop resources assessment and developing climate change adaptation techniques to manage these two.

Course Co-ordinators

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Methods & Techniques in Cognitive and Clinical Neuroscience

Overview

The surge in scientific study in neuroscience and interpretation thereof is one of the significant development in the 21st century. The work builds upon the remarkable advances made in last 50 years in this field. It was a sign of the future to unfold, that the first Nobel Prize of this century in physiology or medicine was awarded to three brain scientists. The implication and potential future impact of research in this area are immense. The range is as wide as addressing issues related to mental disorders to brain-machine interface, neuromarketing, deception research, neural prosthetics etc. While the opportunities are huge, the investigation requires an understanding of methods and techniques of cognitive and clinical neuroscience. This course aims to acquaint participants with latest tools and practices in this field. Internationally acclaimed research faculty with proven knowledge, experience, and demonstrable ability in teaching and research are involved in design and delivery of the course. Course participants will address topics through lectures and hands-on sessions.

Learning Outcomes

By the end of the course the student will be able to demonstrate an understanding of: (i) neurophysiological basis of various techniques (correlational and causal) to measure brain activity patterns; (ii) state-of-the art analytical methods for analysing neural time series data; (ii) pros/ cons and appropriateness of each method and the relationships between different methods; and (iv) brain functioning in both healthy and pathological states.

Modules

A: Human Neuroimaging Methods : July 02 - July 05, 2014
B: Analysis of Neural Time Series : July 07 - July 12, 2014

You Should Attend If...

- you are a scientist, researcher, faculty from Industry / R & D laboratories / academic institutions
- you are a post graduate students from academic institutions (senior level undergraduate students interested in final year project activity in this area may be considered. Working knowledge of MATLAB and basic understanding of signal processing will be necessary.)

Fees

Twenty five seats are proposed for participants from outside IIT Kharagpur. Another twenty five seats are proposed for participants from IIT Kharagpur. All seats will be filled up on first-come-first-served basis.

Participants from abroad : US \$500

Industry / Research Organizations: ₹ 20000

Academic Institutions: ₹ 15000

The above fee include all instructional materials, computer use for tutorials, 24 hrs free internet facility. Outside participants can avail accommodation on payment basis.

The Faculty



Prof. Joydeep Bhattacharya, the major contributor of this course is a Professor of Psychology at the University of London; he is the Director of the EEG laboratory at Goldsmiths. He has been conducting research in the field of cognitive neuroscience over the last fifteen years. Prof. Bhattacharya's research group is actively engaged with understanding human brain functioning in higher complex cognition. He was earlier associated with Max-Planck-Institute in Germany, CalTech in USA, and Austrian Academy of Sciences in Austria. His research has regularly been featured in media e.g., BBC, ABC, The Guardian, The Telegraph, Wall Street Journal, The Economist, Scientific American, New Scientist, Men'sHealth, The New Yorker.



Dr. Caroline Di Bernardi Luft is a Senior Research Fellow working at Goldsmiths, University of London, for an European Commission funded research project, Creativity Enhancement through Advanced brain Mapping and stimulation – CREAM. Caroline has extensive expertise in both EEG and fMRI and worked intensively with Matlab for neural data analysis. Her research interests include brain imaging, brain stimulation, creativity, learning, and advanced data analysis.



Dr. Abhijit Das, MD, DM is the Director of Neurorehabilitation and a Consultant Neurologist at Institute of Neurosciences, Kolkata, India. His expertise includes Cognitive Neurorehabilitation, Cortical Plasticity, Non Invasive Brain Stimulation (TMS/tDCS), Neuroimaging, Parkinson's Disease, Sleep disorders, Behavioral Neurology. His postdoctoral fellowship was at the Kessler Foundation Research Center, West Orange, NJ, USA. He is recipient of many international awards for his contribution in this field.



Prof. Goutam Saha and **Prof. Sudipta Mukhopadhyaya** are faculty members at Dept. of Electronics and ECE, IIT Kharagpur working in the field of biomedical signal processing and biomedical instrumentation for more than a decade. Besides publications each of them hold several patents in this area. Their work have earned recognition from India and abroad.

Course Co-ordinator

Prof. Goutam Saha

Coordinator

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Communication Strategies for Change

Overview

This course allows participants to investigate the theoretical principles of communication of complex information and uncertainty in a global context, with emphasis on strategies for encouraging adoption of different attitudes, new technologies and behaviour change. Participants who take this course will examine different strategies used to raise awareness, communicate about risks, promote new technologies, influence policy and change behaviour.

Through rehearsing practical skills, participants gain an awareness of methodologies of communications research, communications project management, developing communication strategies and undertaking information-sharing and promotion within the framework of the contemporary, international and global communications and media context.

Participants will have the opportunity to:

- improve written and oral presentation skills
- to demonstrate an ability to work effectively in a team
- to prepare and present a professional consultancy report or communication strategy
- and to present complex information in a clear way to non-specialist audiences through the print and electronic media

Goals

The goal of this course are for participants to:

- improve their ability to plan communication activities that will have an impact on the target audiences
- the global communications, risk and policy environments
- an ability to work in a communications context with a team

Modules

A: Communication Basics : July 16 - July 19

B: Communication Strategies : July 21 - July 26

Number of participants for the course will be limited to fifty.

You Should Attend If...

- you are a media, communications, advertising professional interested in understanding the globalised, digital context of communication process and preparing communication strategies for your organization
- you are a student or faculty from an academic institution interested in learning how to improve your oral and written communication and present complex information to a non-specialist audience using the print and electronic media

Fees

The participation fees for taking the modules is as follows:

Participants from abroad : US \$500

Participants from Industry: ₹ 20000

Research Organizations / Academic Institutions: ₹ 10000

Student: ₹ 2500

The above fees includes all instructional materials, computer use for tutorials, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Rob Cover is Associate Professor of Communication and Media Studies at The University of Western Australia. He teaches strategic communication, journalism and writing, and digital media theory, and has prior professional experience as a communications officer, communications strategist and government media consultant. Associate Professor Cover researches and publishes on digital media, cultural approaches to population and mobilities, television narrative, sports media scandals and youth sexualities and suicide.



Dr. David J. Schaefer is a Professor and chair in the Department of Communication Arts at Franciscan University of Steubenville in Ohio. He has worked as a children's program producer in public television and as an announcer and newscaster for several commercial radio stations in the United States mid-west. He has taught undergraduate courses in digital audio/video production, media literacy, film history and theory, Indian cinema, international communications, web design, and media theory, and graduate courses in critical-cultural theory and Indian cinema.

* David Schaefer will teach through Video Conferencing



Suhail Abbasi is a free-lance media professional. Currently he is a Creative Director with a leading television production house. He has over 20 years of experience across television, films and print and has worked with some leading directors of Hindi cinema - like Ketan Mehta, Mukul Anand and Sai Paranjpye. He was the Head of Creative Development and Programming Departments at Sony Entertainment Television Network for over 13 years and has been an integral part of several successful projects.



Anjali Gera Roy is a Professor of Communication at the Department of Humanities & Social Sciences IIT Kharagpur. She has taught courses in communication and media in IIT Kharagpur for the last 25 years and conducted several corporate executive development programmes.

Course Co-ordinator

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Lecture Series by Prof. Sir Michael Berry

Overview

These lectures form a series with the following themes, which will occur and recur with different guises: abstract concepts being illustrated and applied in familiar situations and in nature, and extreme regimes in physics with a geometrical flavour. There will be a gently rising technicality gradient, starting with lectures suitable for the public and ending with our latest work in theoretical physics.

Lectures			
I.	How quantum physics democratized music	:	May 21 at 10 AM
II.	Optica fantastica: images to illuminate the physics of light	:	May 22 at 10 AM
III.	Focusing in the sky	:	May 23 at 10 AM
IV.	The colours of dark light	:	May 24 at 10 AM
V.	The singularities of light: intensity, phase, polarization	:	May 25 at 10 AM
VI.	Superoscillations and weak measurement	:	May 26 at 10 AM
VII.	NH: PT's big brother	:	May 27 at 10 AM
VIII.	Curl forces	:	May 28 at 10 AM
IX.	Seeing and hearing the Riemann zeros, primes, random-matrix ensembles, random waves...	:	May 29 at 10 AM

You Should Attend If...	
	you are a student or faculty from academic institution interested in learning fundamental laws of nature, and if you want to learn more about fundamental laws of nature, how nature and technology can illustrate and bring to life the abstract ideas of Physics and Mathematics in beautiful and unexpected ways.

Fees	
	₹ 500 only The above fee include all instructional materials, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Professor Sir Michael Berry is a world-renowned theoretical physicist whose work on topological and geometrical phases has stimulated and motivated a large amount of theoretical and experimental activity in widely different fields of physics over the last thirty years. These fields include optics, nuclear physics, fluid physics, chemistry, molecular physics, string theory, gravitational physics, cosmology, solid state physics, the foundations of quantum mechanics, and most recently, attempts to develop quantum computing. A few especially transparent examples of the diversity of their impact include the understanding of coherence and wave function entanglement phenomena in optical and electronic systems; the quantum Hall effect, flux quantization and persistent currents in normal and superconducting systems, and the chaotic evolution of a quantum system. Although the geometrical and topological phase effects remain intuitively difficult and abstract, they have become essential ingredients in the development of practical applications like micron sized electronic devices and superconducting quantum interference devices (SQUIDS). Among other work, he is well-known for numerous important contributions to semi-classical physics (asymptotic physics, quantum chaos) applied to wave phenomena in quantum mechanics and other areas such as optics.

Sir Berry is Melville Wills Professor of Physics (Emeritus), University of Bristol. He holds a Bachelor of Science degree in Physics from the University of Exeter and a PhD in theoretical physics from University of St Andrews. He holds ten honorary Doctorates and one honorary Professorship. His career has developed at the University of Bristol, first as a postdoctoral fellow, then Lecturer and then Reader before becoming Professor in 1979. From 2006-2012 he was Editor of the journal, Proceedings of the Royal Society. He was elected a fellow of the Royal Society of London in 1982, and was knighted in 1996. Sir Berry's previous honours include the Dirac Medals of both the Institute of Physics (1990) and the ICTP (1996), the Lilienfeld Prize (1990), the Wolf Prize (1998) and the London Mathematical Society's Polya Prize (2005), and on a lighter note – the IgNobel Prize in physics (2000) for his work on the levitation of frogs. His more than 450 scientific publications cover topics ranging from glaciers, to nonlinear dynamics, to optical diffraction, quantum chaos and caustics. He is also author of Principles of Cosmology and Gravitation. He has given many prestigious lectures and has held visiting positions in Nigeria, Italy, Germany, The Netherlands, Switzerland, France, Australia, New Zealand, the United States, Israel, Mexico, and Belgium. With a well-deserved reputation for polished, elegant and illuminating lectures, he has brought the excitement of contemporary theoretical physics to audiences around the world.

Course Co-ordinator

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Geostatistics in Ecological Modelling

Overview

This course is organized to introduce the application of geostatistics to ecological data for spatial modeling. Geostatistics is based on the intrinsic structure of the variable in space i.e. sampling pattern, spacing and degree of variability within a defined domain in space. The course participants will be able to understand the power of geostatistics. Quality of estimation depends on sample size and distribution. Reliability of geostatistical estimation is dependent on sample quality (size, distribution, reliability etc). The geostatistical models are useful in quantifying uncertainty and project risks in models, and can be used by managers in decision making. Geared to the practitioner, this course provides practical information and exposure to powerful and sophisticated modeling tools for data analysis, correlation, significance testing, including ordination. In addition, the course emphasizes systematic solution approaches and provides the necessary background to understand the tools and apply them correctly and efficiently to ecological problems using modeling. Course participants will address these topics through lectures and hands-on workshops. Specific computer methods will include modeling tools, correlation and regression analysis available software (s).

Course participants will address these topics through lectures and hands-on workshops. Specific computer methods will include modeling tools, correlation and regression analysis using R package, GIS software (ArcGIS).

Courses

A: Basis Geostatistics & Data Analysis using R : 24 Nov - 29 Nov
B: Geostatistical Modeling using ArcGIS software : 01 Dec - 06 Dec

The material in each module is independent and self-contained and can be taken in either or both combination. **Number of participants for will be limited to Fifty.**

You Should Attend If...

- You are an Ecologist, Geologist, Mining or Natural Resources Scientist interested in using geostatistical approaches to quantify uncertainty and project risks.
- You are a student or faculty from academic institution interested in learning the phenomena that vary in space and/or time; and the application of geostatistical methods to regionalized variables.

Fees

Participants from abroad : US\$ 500

Industry/ Research Organizations/Student: Any of two modules : ₹ 15000, All modules : ₹ 25000

Academic Institutions: All modules ₹ 10000

The above fee include all instructional materials, computer use for tutorials, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Abani Ranjan Samal is an expert in geostatistical applications and spatial data analysis in mineral deposit studies He is an established researcher with nearly 14 years of experience in mining industry and is very active in international professional societies & organizations. Currently, He holds the Principal Advisor (Geology) position in 'Rio Tinto (Technology and Innovation) farm at Greater Salt Lake City in USA.



Dr. Jeganathan Chockalingam is currently working as Professor in the Department of Remote Sensing, Birla Institute of Technology (BIT), Ranchi, Jharkhand. He worked at various scientific designations in the Indian Space Research Organisation (ISRO). He has been working in the field of remote sensing and GIS for the last 21 years. His main areas of interest include spatial decision modelling, land cover dynamics, geostatistics, downscaling and space-time vegetation dynamics.



Mukunda Dev Behera is experienced in remote sensing and GIS applications to forest and land resources studies and research. He utilizes advanced statistical techniques for explaining environmental heterogeneity using both parametric and non-parametric principles. Dr. Behera specializes in spatial statistics and modeling having applications to all fields of environment and ecology. He is a faculty at CORAL, IIT Kharagpur.



Arun Chakraborty is experienced in data assimilation, and Ocean dynamics and Ocean circulation modeling of the bay of Bengal. He is developing an operational ocean model for the bay of Bengal. Currently, He is an Associate Professor at the Centre for Oceans, Rivers, Atmosphere and Land Sciences (CORAL) IIT Kharagpur. Currently, He also heads the centre.

Course Co-ordinators

Prof. M. D. Behera

Co-Ordinator

E-mail: mdbehera@coral.iitkgp.ernet.in

(http://www.iitkgp.ac.in/fac-profiles/showprofile.php?empcode=bYmYU&depts_name=N2)

Prof. A. Chakraborty

Co-Ordinator

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Introduction to Geophysical Fluid Dynamics

Overview

Geophysical Fluid Dynamics (GFD) is the study of fluids that are rotating and/or stratified. The two primary examples are the Earth's atmosphere and oceans. Technically, any fluid on the earth is in a rotating frame of reference but it is only the slow and large scale motion of fluids that experiences the Coriolis force (really pseudo-force) to a significant degree. Will offers the student a high-level, unified treatment of the theory of the dynamics of large-scale motions of the oceans and atmosphere. It includes expanded discussions of the fundamentals of geostrophic turbulence, the theory of wave-mean flow interaction, thermocline theory and the finite amplitude baroclinic instability.

Modules

- A: Introduction to the fundamentals of GFD** : Dec 02 - Dec 04
B: Fluid motion in the rotating frame : Dec 05 - Dec 08
C: The theory of the dynamics of large-scale motions of the oceans and atmosphere : Dec 09 - Dec 17

The course material contains three modules.

Number of participants for the course will be limited to fifty.

You Should Attend If...

- you are a scientist or engineer working in the area of atmospheric / Ocean / climate science and modeling and interested to learn more about geophysical fluid flows
- you are a student or faculty from academic institution interested in learning geophysical fluid flows and how to solve them with advanced computer tools.

Fees

The participation fees for taking the modules is as follows:

Participants from abroad : US\$ 500

Industry/ Research Organizations/Student : All modules : ₹ 20000

Academic Institutions: All modules : ₹ 10000

The above fee include all instructional materials, computer use for tutorials, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Prof. Ilson C A da Silveira is a renowned oceanographer and professor of University of Sao Paulo. His area of research includes experimental, theoretical and numerical dynamic oceanography. He has done extensive work on mesoscale dynamics associated with western boundary currents with an emphasis on studies of geophysics instability and vortex formation. has established an international group with advanced Oceanic Dynamics Laboratory is involved in pioneer research focusing on physical oceanography, and dynamic analysis of observations and numerical modeling of ocean processes. Professor Ilson's group has many international collaborators like MIT, University of Massachusetts and is involved in various scientific projects including data acquisition by cruises. He has several international reputed publications and supervised seven PhD theses, three post doctoral work and more than thirty M.Sc and B.Sc dissertations.



Prof. Avijit Gangopadhyay is an eminent Professor and Associate Dean of School for Marine Science & Technology University of Massachusetts Dartmouth and also the honorary associate in Harvard Oceanography group. During his Ph.D. studies at the University of Rhode Island, he worked on Gulf Stream separation dynamics and autoregressive modeling of gappy and sparse satellite time-series. After completing Ph.D., he joined the Harvard Oceanography Group and built expertise in initialization, validation and calibration of dynamical models for the Gulf Stream region for mesoscale forecasting. He also worked with the team of scientists at NASA's Jet Propulsion Laboratory working on basin-scale numerical models in both the Atlantic and the Pacific. Presently, Professor Gangopadhyay is currently working on coastal operational ocean modeling, basin-scale circulation modeling, North Atlantic oscillation and its impact on the Gulf Stream, the Gulf of Maine and the ecosystem. He has been advisor to the director of IIT Bhubaneswar and honorary professor both at IIT Bhubaneswar and Kharagpur. He is also offered the prestigious Samudragupta chair by Ministry of Earth Sciences, Government of India.



Prof. Arun Chakraborty is associate professor and head of the Center Oceans, Rivers, Atmosphere and Land Sciences (CORAL), Indian Institute of Technology Kharagpur. His research has focused mainly on Ocean dynamics, ocean circulation, modeling of the Bay of Bengal and Data Assimilation. He has several publications in reputed national and international journals. Professor Chakraborty is frequently invited to give guest talk in various universities and institutes. He has been offered as James Rennell Fellow by the Ministry of Earth Sciences, Government of India for his valuable contribution towards ocean science.

Course Co-ordinator

Prof. Arun Chakraborty

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Genomics, Metagenomics and Metabolic Engineering

Overview

Metabolic engineering that considers metabolism and cellular system as an entirety and allows purposeful modification of biochemical pathways using recombinant DNA and other molecular biology techniques has emerged as one of most promising fields of biotechnology and bioengineering. In last two decades this subject has established its potential to produce a vast range of natural and synthetic chemicals from simple, readily available, inexpensive resources. The field of metabolic engineering is being transformed with expansion of the chemical palate of cells. Most significant advances have been made in the production of biofuels, biopolymers and precursors, pharmaceuticals and nutraceuticals and commodity and speciality chemicals. Developments in the 'post genomic era' including the recent advent and application of high throughput sequencing tools including analysis of whole genome, metagenome, metatranscriptome of diverse organism or environmental samples, and precise techniques for studying the cellular metabolism have allowed a paradigm shift in metabolic engineering. Instead of perturbing individual pathways, our ability to manipulate the entire cell itself has given rise to the concept of 'systems metabolic engineering'. As a result, the metabolic engineering tool box is greatly expanding from conventional approaches to more creative tools capable of controlling gene expression and modulating regulatory networks throughout the whole cell. This holistic approach not only helps in discovery of new pathway but also paves the way for novel metabolic production in a bioreactor.

The course on Genomics, Metagenomics and Metabolic engineering is designed to provide a thorough understanding of the recent developments in the background of fundamentals of metabolic engineering and genomic approaches. The participants will be exposed to the basic understanding of metabolic engineering, genomics and metagenomics followed by the topics on systems metabolic engineering concept.

Courses

Dec 8th 2014 - Dec 18th 2014

The course will comprise of both Lectures and Hands-on laboratory classes including bioinformatics analyses. **Number of participants for the course will be limited to thirty.**

You Should Attend If...

- you are a professional (faculty/scientist/engineer) interested in obtaining improved understanding on genomics, metagenomics and metabolic engineering and exposure to laboratory techniques on this subject .
- you are a student from academic institution interested in higher learning on metabolic engineering and systems approaches in metabolic engineering with genomics approach.

Fees

The participation fees for taking this course is as follows:

Participants from abroad : US\$ 500

Professionals from industry : ₹ 30000

Faculty/scientists from academic/research organizations: ₹ 20000

Students from academic Institutions: ₹ 10000

The above fee include all instructional materials, computer use for tutorials, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



George N Bennett, E. Dell Butcher Professor of Biochemistry and Cell Biology at Rice University, Houston, TX, USA is an expert on microbial metabolic engineering. Prof Bennett's research focus includes metabolic engineering of bacteria to augment production of industrially important chemicals and solvents He has a large number of publications and patented technologies to his credit. Prof Bennett is an elected fellow of the American Association for the Advancement of Science and recipient of several major awards including the Waksman prize, Hamill innovation award and Faculty initiative award. With *Escherichia coli* his studies have helped in defining mechanisms of regulation of gene expression, metabolic engineering for acetate reduction, modification of redox cofactor availability, and reprogramming of metabolic networks for chemical production. With the anaerobic *Clostridium acetobutylicum*, studies have concerned genes and enzymes of butanol formation and the biodegradation of nitroaromatics. His current research interests include metabolic engineering of microbes for chemical production, generating genetic tools for synthetic biology and investigating the mechanisms of environmental responses of bacteria. He is interested in using microbes for sustainable industrial, agricultural and environmental processes.



Prof. Tulasi Satyanarayana is an eminent microbiologist and Professor at Department of Microbiology, University of Delhi, South Campus, New Delhi. Prof. Satyanarayana has been involved in microbial research ranging from microbial enzymes, bacterial diversity, antifungal antibiotic production to carbon sequestration and metagenomics. Prof. Satyanarayana is a recipient of several awards including Dr. G.B. Manjrekar Memorial award of Association of Microbiologist in India in 2003 for significant contributions in the field of microbiology. Dr. Satyanarayan has authored 7 books, 71 review and 136 research articles and has 3 patents to his credit.



Prof. Dhrubajyoti Chattopadhyay, a distinguished Guha Professor, is currently in the Dr. B C Guha Centre for Genetic Engineering and Department of Biotechnology, Calcutta University. His current research interest includes Microbial biodiversity using metagenomic approach; RNMV-induced growth promotion in jute: its possible mechanism and utilization for sustainable production; Development of potent anti-viral agents against Chandipura virus; and cellular and molecular mechanism of emphysema and molecular mechanism of glutamic acid induced cell migration in neutrophils. Prof Chattopadhyay has received several very prestigious awards including the UNESCO-IUMS-MIRCENS-SGM Fellowship. Dr. Chattopadhyay has authored 91 international papers and has one patent to his credit.



Prof. Mrinal K Maiti is an Associate Professor of Biotechnology at IIT Kharagpur. His research has focused mainly on Functional genomics of rice plant; Metabolic engineering of plant and fungal storage-lipids; Bioprospecting of endophytic microbes for pharmaceuticals.



Prof. Ramakrishna Sen is an Associate Professor of Biotechnology at IIT Kharagpur. His research has focused mainly on Bioenergy (Algal Biofuels and Bio-CCS, Biorefinery, Enzymes and Biofuels technology); Probiotics and Nutraceuticals, Bioprocess Development Modeling & Optimization; Environmental Biotechnology and Biosensor. His research activities have been recognized by several awards, including the 2007 UKIERI Award for Exchange Visits (UK) and Fulbright visiting (USA) faculty award in 2013.



Prof. Pinaki Sar is an Associate Professor of Biotechnology at IIT Kharagpur. His research has focused mainly on Microbial diversity and function with culture independent metagenomic approach; Geomicrobiology of arsenic contaminated groundwater and Bioremediation of petroleum hydrocarbon contaminated wastes. His research activities have been recognized by several awards, including the 2007 BOYCAST Award from DST, Govt. of India.

Several other distinguished international/national faculty experts [Prof M Hattori, Prof Rup Lal, Dr Rakesh Sharma and Dr. Sharmila Mande] **are expected to deliver lectures as well.**

Course Co-ordinator

Prof. Pinaki Sar
Coordinator

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Micro & Nano-scale Transport for Bio and Energy Applications

Overview

A large number of engineering problems related to practical applications like oil and gas recovery, water quality monitoring, detection of different biomolecules of interest for biosensors (such as in medical diagnostics), targeted drug delivery/ blood extraction, miniaturized energy conversion, inkjet printing, and even underground bioconversion of coal involve the understanding of fluid transport in micro and nano confinements. The proposed course will cover the fundamental aspects of fluid transport in micro/nano-scales and provide key examples how such fundamental knowledge is related to various engineering systems relevant to bio and energy applications.

Objectives

The primary objectives of the course are as follows:

- Exposing participants to the fundamentals aspects of fluid transport in micro and nano confinements,
- Providing exposure to relevant engineering problems,
- Providing exposure to hands-on experience with micro/nano-scale fluid mechanics through laboratory sessions,
- Enhancing the overall appreciation of the convergence of science and engineering for societal impact.

Courses

Module A: Fundamental - Part I	:	December 8 - December 10, 2014
Module B: Application - Part I	:	December 11 - December 13, 2014
Module C: Fundamental - Part II	:	December 15 - December 17, 2014
Module D: Application - Part II	:	December 18 - December 20, 2014

You Should Attend If...

- Executives, engineers and researchers from manufacturing, service and government organizations including R&D laboratories.
- Students at all levels (B.Tech/M.Sc/M.Tech/PhD) or Faculty members from reputed academic institutions and technical institutions.

Fees

The participation fees for taking the modules is as follows:

Participants from abroad : US\$ 500

Industry/ Research Organizations/Student: Any of two modules : ₹ 20000, All modules : ₹ 30000

Academic Institutions: All modules ₹ 10000

The above fee includes all instructional materials, computer use for tutorials, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Prof. Sushanta Mitra a Professor in Mechanical Engineering and Assistant Vice-President (Research) at the University of Alberta. He is the Associate Scientific Director for IC-IMPACTS and Theme Leader for Integrated Water Management. He has been elected fellow of the American Society of Mechanical Engineers (ASME) and the Canadian Society for Mechanical Engineering (CSME) for his contributions in Mechanical Engineering and also elected as the fellow of the Engineering Institute of Canada (EIC) for his exceptional contributions to engineering in Canada.



Prof. Suman Chakraborty is currently a Professor in the Mechanical Engineering Department of the Indian Institute of Technology (IIT) Kharagpur, India. He has been awarded the Santi Swarup Bhatnagar Prize in the year 2013. He has been elected as a Fellow of the Indian National Academy of Science (FNASc), Fellow of the Indian National Academy of Engineering (FNAE), recipient of the Indo-US Research Fellowship, Scopus Young Scientist Award for high citation of his research in scientific/technical Journals, and Young Scientist/ Young Engineer Awards from various National Academies of Science and Engineering. He has also been an Alexander von Humboldt Fellow and a Visiting Professor at the Stanford University. He has 240+ International Journal publications.

Course Co-ordinator

Professor Suman Chakraborty

Principal Coordinator

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Management, IIT Kharagpur

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Spatial Ecology & Remote Sensing

Overview

This course is organized in two modules that can be taken altogether or in subsets. The topics include scale and pattern, spatial autocorrelation including both true/ inherent and induced, and deriving patterns from satellite remote sensing data. Choosing a scale that is appropriate to the ecological process in question is very important in accurately hypothesizing and determining the underlying cause. Most often, ecological patterns are a result of multiple ecological processes, which often operate at more than one spatial scale. Due to the presence of spatial autocorrelation, in nature gradients are generally found at the global level, whereas patches represent intermediate (regional) scales, and noise at local scales. Hundreds of remotely sensed satellites are gathering data on various earth surface features at varied spatial, temporal, spectral and temporal resolutions. And the raw and processed data are increasingly being available for studies and research at different scales. Course participants will address these topics through lectures and hands-on workshops. Specific computer methods will include modeling tools, remote sensing and GIS data interpretation and analysis.

Most ecological data exhibit some degree of spatial autocorrelation, depending on the ecological scale (spatial resolution) of interest. As the spatial arrangement of most ecological data is not random, traditional random population samples tend to overestimate the true value of a variable, or infer significant correlation where there is none. This bias can be corrected through the use of more statistically advanced models.

Modules

A: Scale, pattern and Spatial Autocorrelation : Dec 15 - Dec 19

B: Scale and patterns in satellite data, and GIS : Dec 22 - Dec 27

The material in each module is independent and self-contained and can be taken in either or both combination. **Number of participants for the course will be limited to fifty.**

You Should Attend If...

- you are an Ecologist, Geologist, Mining or Natural Resources Scientist interested in using spatial statistics approach to scale and pattern analysis in remotely sensed data.
- you are a student or faculty from academic institution interested in learning the spatial pattern of homogeneity and heterogeneity that vary in space and/or time; and the application of statistical methods to study regionalized variables.

Fees

Participants from abroad : US \$500

Industry/ Research Organizations: Any of two modules : ₹ 15000, All modules : ₹ 25000

Academic Institutions: All modules : ₹ 10000

The above fee include all instructional materials, computer use for tutorials, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Anu Swatantran is an Assistant Research Professor in the Department of Geographical Sciences at the University of Maryland, College Park USA. She focuses on developing approaches for integrating large multi-sensor remotely sensed data and geospatial technologies for tackling research questions in earth and environmental science. She is a NASA Earth System Science Fellowship recipient.



B. S. Daya Sagar is an Associate Professor and founding Head of Systems Science and Informatics Unit (SSIU) of Indian Statistical Institute Bangalore, India. He is interested in applications of mathematical morphology, digital image processing, fractals and multifractals in extraction, analyses, modeling of terrestrial phenomena and processes, and GIS. He uses nonlinear concepts to understand the spatio-temporal dynamics in discrete space, multi-fractals and 1-D maps to characterize the heterogeneities.



Mukunda Dev Behera is experienced in remote sensing and GIS applications to forest and land resources studies and research. He utilizes advanced statistical techniques for explaining environmental heterogeneity using both parametric and non-parametric principles. Dr Behera specializes in spatial statistics and modeling having applications to all fields of environment and ecology. He is a faculty at CORAL, IIT Kharagpur.



Arun Chakraborty is experienced in data assimilation, and Ocean dynamics and Ocean circulation modeling of the bay of Bengal. He is developing an operational ocean model for the bay of Bengal. Currently, He is an Associate Professor at the Centre for Oceans, Rivers, Atmosphere and Land Sciences (CORAL) IIT Kharagpur. Currently, He also heads the centre.

Course Co-ordinators

Prof. M. D. Behera

(http://www.iitkgp.ac.in/fac-profiles/showprofile.php?empcode=bYmYU&depts_name=N2):

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Prof. A. Chakraborty

(http://www.iitkgp.ac.in/fac-profiles/showprofile.php?empcode=bXmYX&depts_name=N2):

E-mail: arunc@coral.iitkgp.ernet.in



<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Aircraft Design Practices

Overview

The lecture 'Aircraft Design' is composed of lecture, design practice, seminar, examination, evaluation and grading, and is provided to students who have fundamental aerospace engineering knowledge and experience during the period of Dec. 22~31, 2014 (30 hrs) by Lecturer, Prof. C. D. Kong. The contents of lecture are Introduction, overview of the design process, new technology development and history of aviation, design team and concurrent engineering, design criteria of transport and military aircrafts, design requirements, aircraft categories(FAR), techniques for aircraft configuration optimization, phase of aircraft design, design process, conceptual design, preliminary design, detail design, typical mission profile for sizing, step-by-step development of a new design (ten steps), preliminary sizing (part I), commercial and military airplane design, preliminary configuration design and integration of propulsion system (part II).

At the end of lecture, the aircraft design practice is carried out by students. Based on some basic aircraft design knowledge obtained through the lecture on 'Aircraft Design', students who attend the ISWT Aircraft Design Course carry out the design practice themselves a general aviation class aircraft under Lecturer's guide. This design practice gives practically students both design capability and experience how to design the light aircraft. Lecturer gives design requirements of the target general aviation class light aircraft (2 seats) that satisfies FAR Part 23, and guides all the design procedure to the preliminary design phase. Students should carry out the conceptual design and the preliminary design of the light aircraft that meets the design requirements, design criteria, regulations, etc. using design related data, equations, computer programs, references, etc. After completion of the design, students should submit their design reports including sizing results and CAD drawings, and take presentations at a design seminar. Finally examinations and grading are performed for evaluation of students(2 credits: seven scale letter grade system).

Modules

A: Introduction & sizing for typical mission profile, and step by step design procedure: December, 22 - December 26, 2014

B: Design of General Aviation Class Light Aircraft : December, 27 - December 31, 2014

The material in module B is dependent on module A and should be taken in combination. **Number of participants for the course will be limited to thirty.**

You Should Attend If...

- you are an Aerospace Engineer interested in obtaining improved knowledge for the conceptual and details design of aircraft and space vehicles.
- you are a student/faculty from academic institution learning / teaching aerospace engineering and interested in learning how to use your knowledge for the design of aerospace vehicles, being the ultimate purpose of every aerospace engineer.

Fees

The participation fees for taking the modules is as follows:

Participants from abroad : US \$500

Industry/ Research Organizations/Student: Any of two modules : ₹ 20000, All modules : ₹ 30000/-

Academic Institutions: All modules : ₹ 10000/

The above fee include all instructional materials, computer use for tutorials, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Prof. Changduk Kong graduated with a BSc in Aerospace Engineering from the Korea Aerospace University and a PhD in Aerospace Engineering from the Osaka Prefecture University, Japan. He was appointed to Professor in 1994 in the Department of Aerospace Engineering at Chosun University and was Dean of the School of Aerospace and Naval Architecture Engineering in 1999/2005-2006 and Dean of the Facility Management Office at Chosun University, 2011-2012.

Prof. Kong has contributed greatly to the development of Aerospace Engineering in Korea, primarily through his roles as President of SASE (The Society for Aerospace System Engineering) in 2013-2014, President of ICRC (International Collaboration Research Centre in Natural Composites, Chosun University) since 2012, former President of KSAS (The Korean Society for Aeronautical and Space Sciences, 2012), former President of KSPE (The Korean Society of Propulsion Engineers, 2007-2008), Ex-Chair of Cycle Innovation-IGTI-ASME between 2009 and 2011, former President of RIME (Research Institute of Mechanical Engineering-Chosun University, 2006-2008) and former Head of the Aero-Propulsion Division of ADD (Agency for Defence Development, 1978-1994), First Lieutenant of ROKAF(Republic of Korea Air Forces, 1974-1978).

He was Visiting Professor at Imperial College London (2011-2012) and is on the Editorial Board of IJTJ, IJCM, AEAT (2001-present), and Editor-in-Chief of JKAS and KJSPE(2006-2010). He received the Korean National Decoration in Science for his scientific achievement and contribution to Korean aerospace development, and Academic Achievement Awards from KSAS and KSPE.

Prof. Kong has authored and co-authored more than 600 papers including 61 SCI journal papers, and has received numerous lecture invitations from companies, research institutes and universities and delivered six keynotes and invited lectures at international conferences. He has organized 19 national conferences, forums and workshops and was co-organiser on three international conferences.



Prof. P. K. Datta, Dr. Anup Ghosh and Dr. N. K. Peyada are Professors of Department of Aerospace Engineering at IIT Kharagpur. Their research have focused

heavily on buckling of composite laminates, aeroelasticity, follower forces, smart composite structure, damage detection of composite structures, System Identification/Parameter Estimation - Neural Networks, Flight Dynamics, Control and Flight Testing, Design Guidance and Control of Rockets, Parafoil, UAV, MAV, WIG-Craft etc.

Course Co-ordinator

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<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Multi-scale Modeling of Advanced Materials

Overview

This course is organized in two modules that can be taken altogether or in subsets. The topics include multi-scale modeling (MSM) and its implementation to composite materials through hierarchical MSM, finite temperature constitutive relations for multilattice crystals, Quasi Harmonic (QH) approximations, atomistic continuum coupling for static, dynamic and finite temperature case, energy based Quasi Continuum (QC) methods, Ghost forces and correction methods, finite temperature equilibrium and non-equilibrium MSM, and generalized Langevin equations. The course stresses the application of MSM for the damage evaluation using Nanoscale-Informed Damage Mechanics (NIDM). In addition, the course provides a broad insight for modeling the damage at nano scale for polymer and polymer nano composites, NIDM model development for neat polymer resin, and polymer resin with nanographene platelets. Further, the benchmark topics such as characterization and correlations of non-linear stress-strain behavior from NIDM with Molecular Dynamics Simulation (MDS) and coupling NIDM model to three dimensional finite element analysis through micromechanical modeling at meso scale will be discussed in detail. Geared to the practitioner, this course provides practical information and exposure to powerful and sophisticated modeling tools. Additionally, the course provides an essential background to understand the general physics and relate it to the required mechanics and mathematics and emphasizes systematic solution approaches so as to apply them correctly and efficiently to the required problem.

In this course, the instructor will share his extensive experience in collaborating with NASA, the Army, and the Air Force on challenging research projects related to Multi-scale Modeling of Advanced Materials. The ISWT course on Multi-scale Modeling of Advanced Materials is designed to enable participants to be able to design a nano-particle-reinforced composite component spanning over many length-scales and time-scales, based on the fundamental principles of physics, chemistry, thermodynamics, and mechanics.

Modules

A: Multi-Scale Modeling: Concepts, Modeling & Analysis : December 22— December 26, 2014
B: Application Oriented MSM: Damage Mechanics : December 27 - December 31, 2014
 The material in module B is dependent on module A, self-contained and can be taken in either or both combination. **Number of participants for the course will be limited to fifty.**

You Should Attend If...

- you are an Aerospace Engineer interested in obtaining improved knowledge for the conceptual and detailed modeling analysis of composite materials through MSM.
- You are a Graduate and undergraduate students from any engineering majors and employees of the aerospace industry who are interested regarding design and modeling of advanced materials and nano particle reinforced composite materials.

Fees

The participation fees for taking the modules is as follows:
Participants from abroad : US\$ 500
Industry/ Research Organizations/Student : Any of two modules : ₹ 20000, All modules: ₹ 30000
Academic Institutions: All modules : ₹ 10000
 The above fee include all instructional materials, computer use for tutorials, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Dr. Samit Roy is the William D. Jordan Chair Professor of Aerospace Engineering and Mechanics at University of Alabama, Tuscaloosa. Before moving to an academic position, he was a Senior Research Engineer at the Southwest Research Institute (SWRI), San Antonio, Texas. Dr. Roy has authored 60 journal papers, 11 book chapters, 1 book, and more than 80 conference papers. Prof. Roy's research interest is directed toward multi-scale modeling and failure prediction of fiber reinforced polymer composites and structural adhesives subjected to environmental conditions, using the finite element method. His research centers around the development of mechanism-based multi-scale structural durability models that would accurately predict long-term performance of materials based on data from short-term tests. He is also actively involved in the application and simulation of nanostructured reinforcements in enhancing performance of composite materials.



Dr. B. N. Singh is Professor and Head of the Department of Aerospace Engineering at the Indian Institute of Technology Kharagpur, India. Prof. Singh has more than 21 years of teaching and/or research experience in the institute of importance in India and abroad as well. His research interest is directed towards multi-scale modeling of advanced materials. He is working in the area of aerospace composite structures and its uncertainty quantification and has developed several stochastic and deterministic mathematical models and its applications in aerospace structural components made of smart composites. His current research interests also include plates and shells, functionally graded materials, analytical and finite element modeling, shear deformation theories, aeroelasticity, and nonlinear adaptive FEM. He has published 93 research papers in the Journals of repute and more than 73 research papers in Conference proceedings.

Course Co-ordinator

Dr. B. N. Singh
 Professor & Head
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 IIT Kharagpur-721 302, India
 Email: bnsingh@aero.iitkgp.ernet.in



<http://www.mymail.iitkgp.ernet.in/iswt/courses.php>

Registration Process

Registration for ISWT courses is not automatic because of the constraints on maximum number of participants allowed to register for a course. In order to register for one or multiple non-overlapping courses, you have to apply online using the following steps:

1. Create login and password at www.iitkgp.ac.in/iswt/
2. Login and complete the registration form.
3. Select courses
4. Confirm your application and payment information.
5. Pay ₹ 500/- (non-refundable) through online payment gateway.

You can also apply offline by completing offline application form and send the completed application along with a bank draft of ₹ 500 drawn in favour of 'CEP-ISWT, IIT Kharagpur' payable at Kharagpur to the following address :

International Summer & Winter Term
Continuing Education Cell
IIT Kharagpur
Kharagpur - 721302, India

The course coordinators of the selected courses will go through your application and confirm your selection as a participant one month before the starting date of the courses. Once you are selected you will be informed and requested to pay the full fees through online payment gateway service.



INTERNATIONAL SUMMER & WINTER TERM INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

Kharagpur-721302, INDIA

May - July | December 2014

REGISTRATION FORM

Name

Date of Birth Nationality

Male Female Contact No (Mobile)

Email

You are a: (tick any one) Student Faculty Professional

Affiliation

Academic Qualification

Degree	Discipline	Institution	CGPA / % marks	Year

Experience

Demand Draft Details (₹ 500)

Course Selection

Code / Module	Name



Signature



INDIAN INSTITUTE OF TECHNOLOGY

Dedicated to the service of the Nation