

DST-INSPIRE INTERNSHIP SCIENCE CAMP - 2013



Department of Science & Technology
Govt. of India

In association with



Jagadis Bose National Science Talent Search
Govt. of West Bengal

Science Camp Entitled:

“Learning Science”

January 04 – 08, 2013

At JB Centre of Excellence for Student – Scientists



Jagadis Bose National Science Talent Search,

1300, Rajdanga Main Road, Kasba, Kolkata – 700 107

Phone : 2441 7542, 2442 8270 Fax : (033) 2442 8267

E-mail: jbnsts@gmail.com / jbnsts@vsnl.com; Website : <http://www.jbnsts.org>

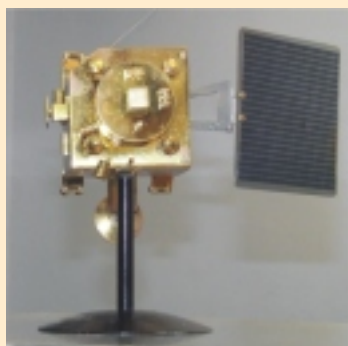
“Learning Science”

About JBNSTS

Jagadis Bose National Science Talent Search (JBNSTS), Kolkata was conceptualized in 1958 by visionaries such as Dr. B C Roy, Sir J J Ghandy and others to commemorate the Birth Centenary Celebration of India's first modern scientist, Acharya J C Bose. The program was inaugurated by Pandit Jawaharlal Nehru. JBNSTS is an autonomous institute promoted by the Department of Higher Education, Government of West Bengal. It is administered by a Governing Body with representatives from the State Government, academia and industry. Since 1961, JBNSTS is awarding the prestigious Jagadis Bose Scholarships to selected group of undergraduate students of science, engineering and medicine.



In the last five decades, JBNSTS has grown to become a premiere institute of non-formal science education in the eastern and northeastern States of India with the objective towards pursuit of excellence through motivation, identification and nurture of young talented science students. It helps students to realize the importance of excellence in the scientific world and try to cultivate this in their own lives as students of science. JBNSTS also encourages students towards the learning of basic sciences and inculcates scientific spirit in the minds of young high school and undergraduate students. Focus has been given on unconventional and dynamic methods of non-formal accelerated learning through "out-of-class" activities, which have led to the recognition of intellectually sensitive and inquisitive minds. Since 2004, JBNSTS has launched an innovative middle school science Teachers Training Program which has brought into its ambit motivated teachers from the districts of West Bengal. JBNSTS has developed science kits and distributed to the teachers for demonstrating scientific principles to the middle school students in the classroom. The financial support for most of the activities of



JBNSTS is provided by the Department of Higher Education & Department of Science & Technology, Government of West Bengal. In addition, Council of Scientific & Industrial Research (CSIR), Department of Science & Technology (DST), Government of India & Industries also collaborate with JBNSTS activities.

About DST-INSPIRE Program

Innovation in Science Pursuit for Inspired REsearch (INSPIRE) is an innovative programme being implemented by the Department of Science and Technology (DST), Govt. of India. The basic objective of INSPIRE is to communicate to the youth of the country the excitement of creative pursuit of science, attract talent to the study of science at an early age and thus build the required critical human resource pool for strengthening and expanding the Science & Technology System and Research & Development base. Under the INSPIRE project 'Scheme for Early Attraction of Talents for Science' (SEATS) is a program to inspire talented Science students (top 1% performers in class-X board examination) into basic science streams.



A striking feature of the programme is that it does not believe in conducting competitive exams for identification of talent at any level. It believes in and relies on the efficacy of the existing educational structure for identification of talent and builds on opportunities that can be derived within the systems.

Science camps are a great way for children to explore the principles and methods of scientific research and strive to get young people interested in science at an early age. They are based on concepts of facilitated self-learning, holistic education, group activities, exchange of cross-cultural ideas, motivation towards independent thought and action and forming life-long friendships with similar minded people and established scientists. Leadership, passion and appreciation of the nature around us are invaluable characteristics for future scientists, and the Science Camp activities strive to encourage these traits.



Organizing Committee

Academic Committee:

Prof. (Dr.) Papiya Nandy, Hony. Director, JBNSTS

Dr. Paromita Roy, Dy. Director, JBNSTS

Dr. Abhijit Kar, Scientific Officer, JBNSTS

Dr. Smarajit Manna, Student Advisor, JBNSTS

Camp Coordinators:

Shri Joydip Das, Asst. Director (Admin), JBNSTS

Shri Dipankar Sarkar

Shri Prasenjit Chakraborty



Mentors

Dr. Partha Ghose

Senior Scientist Platinum Jubilee Fellow
National Academy of Sciences, India
Bose Institute, Kolkata

Dr. Ei Ichi Negishi

Professor
Department of Chemistry
Purdue University, USA

Dr. Siddhartha Sen

Emeritus Fellow
Institute of Nano-science
Trinity College, Dublin, Ireland

Dr. Ronald Prinn

Director
Centre for Global Change Science
Massachusetts Institute of Technology, USA

Dr. N. Mohilal Meitei

Associate professor
Department of Life Sciences
Manipur University
Imphal East, Manipur

Dr. Manju Ray

Emeritus Professor, CSIR
Bose Institute, Kolkata

Dr. Paromita Roy

Deputy Director
JBNSTS

Shri Samar Bagchi

Science Communicators' Forum,
Kolkata

Dr. Soumen Kr. Roy

Professor
Department of Physics
Jadavpur University, Kolkata

Mr. Rintu Nath

Scientist 'E'
Division Head: Information Systems & Laboratories
Vigyan Prasar
Noida, U.P.

Dr. Abhijit Kar

Scientific Officer, JBNSTS

Dr. Smarajit Manna

Student Advisor, JBNSTS

Dr. Subhrangsu Aditya

School of Bio Science & Engineering
and School of Cognitive Science
Jadavpur University, Kolkata – 700032

Dr. Bimalendu Bhusan Bhattacharya

INAE Distinguished Professor
S. N. Bose National Centre for Basic Sciences
Salt Lake, Kolkata

“Learning Science”

CAMP RULES

Welcome to the Science Camp “Learning Science”

Here you will have a unique experience of learning science through active interaction with great scientists and be encouraged to share your ideas with others. No test / grade-only learning science in a different way.

Please note the following points carefully:

1. The camp hours are from **09:30 a.m. to 5:00 p.m.** You are to attend all the sessions in your school uniform. **MOBILE PHONES MUST BE KEPT IN SWITCH OFF MODE DURING ALL ACADEMIC SESSIONS.**
2. You are required to submit an attested copy of your Xth Standard Board Examination Mark Sheet, held in 2012 and filled-in STUDENT'S INFORMATION SHEET during the afternoon registration on **4th January, 2013** at registration desk.
3. On **5th January, 2013** all the students have to report at JBNSTS campus **at 9.30 a.m. for visit to Science City.**
4. Travel bills (bus, auto and / or train fare only) are to be submitted on **7th January, 2013 during 9.30 a.m. – 10.00 a.m. (during morning registration).** Your reimbursement will be made on **8th January, 2013 between 01.00 p.m. to 02.00 p.m.**
5. All students of the Science Camp will receive the library membership of British Council Library (BCL) for the next one year. During that period you will be able to borrow book(s) from BCL and search /read books online. You will be given a registration form (**4th January, 2013**) for the library membership which you need to fill up and submit to us on **5th January, 2013 at registration desk during afternoon registration (At Science City).** Your membership card will be given to you on **8th January, 2013.**
6. All the participants will be divided into groups. There will be a group leader for each group *selected by group members of each group.* On **8th January, 2013,** there will be a session for Project Presentation by the participating students. Each group has to prepare a scientific project through Poster and / or Model and will have to display during **02:00 p.m. – 05:00 p.m.** The presentation would be evaluated by judges' bench.
7. You are required to fill up the FEED BACK SHEET and submit it on **8th January, 2013 at registration desk during afternoon registration.**
8. You will not be given any home work, but you are expected to interact freely with the experts, your group members and other groups.

On the last day i.e. **8th January, 2013** you will receive the Participation Certificate.

Name of the participating schools:

- Lakshmipat Singhania Academy, Kolkata
- Adamas International School, Kolkata
- Dolna Day School, Ballygunge, Kolkata
- St. Augustine's Day School, Kolkata
- St. Augustine's Day School, Shyamnagar
- Delhi Public School Ruby Park, Kolkata
- Garden High School, Kolkata
- Army Public School, Ballygunge, Kolkata
- Modern High School for Girls', Kolkata
- St. Lawrence High School, Ballygunge, Kolkata
- Nava Nalanda High School, Kolkata



BRIEF INTRODUCTION TO THE EXPERTS

DR. PAPIYA NANDY

Prof. Papiya Nandy received her Masters degrees in Physics from University of Calcutta and University of California at Santa Barbara and Ph.D. on Liquid Crystals from Kent State University, USA. Her post-doctoral work was in Experimental Biophysics from Max Planck Institute, Gottingen, Germany. Later she was Associate Professor of Physics in University of Ulm, Germany. She joined Physics department in Jadavpur University and besides teaching for more than 35 years in the Science and Engineering faculties, she was and still is in charge of several research projects. Her field of research encompasses membrane biophysics, numerical analysis of DNA and protein sequences and application of Nanomaterials in ceramics and bio systems. She has more than hundred research publications in peer reviewed journals and 3 patent awards. She has guided 12 Ph.D. Thesis and 20 Masters Thesis. She is currently the Emeritus Fellow of Jadavpur University and the Hony. Director of JBNSTS, of which she is a scholar from the first batch in 1960. Here her objective is to make JBNSTS a vibrant and dynamic institute and to motivate, identify and nurture young talented science students and establish the base of scientific enquiry and culture of tomorrow.

DR. PARTHA GHOSE

Dr. Ghose is a Senior Scientist, Platinum Jubilee Fellow (National Academy of Sciences, India) and is associated with Center for Astro Particle Physics & Space Science, Bose Institute. He was also a former faculty of SN Bose National Centre for Basic Sciences, Kolkata. He did his graduation and doctorate from Calcutta University. He has occupied distinguished positions in different academic institutions in India and abroad. Prof Partha Ghose has written many popular science articles in Bengali and English for various Journals and magazines and dailies. He was associated with the production of videocassette series on 'Classical Mechanics' and 'Quantum Theory' for UGC Country- wide Classroom series. Prof Ghose was associated with many episodes of the popular television science serial titled 'Quest'. He has also been a part of different science programs involving students from various levels. Prof. Ghose was the joint conductor of the first Science Camp of JBNSTS and held in November, 2006.

DR. EI ICHI NEGISHI

All chemical reactions involve rearrangement of atoms, which in turn involve breaking some bonds and making new bonds. Carbon-carbon bonds can be broken easily, but in order to create complex chemicals, chemists need to be able to join carbon atoms together. Chemists did develop some methods to join carbon atoms together, which worked when creating simple molecules. In fact, efficiently forming carbon-to-carbon bonds has long been a focus of chemistry, and various methods – starting with Victor Grignard's use of magnesium to help bind carbon atoms in 1912 – have been awarded the chemistry Nobel. But when trying to synthesise more complex molecules, they ended up with too many unwanted by-products in their test tubes.

In course of time, reactions using the relatively rare silvery-white metal palladium as catalyst solved that problem and provided chemists with a more precise and efficient tool to work with. The technique enabled the building of complex organic compounds with wide application in medicine, industry and agriculture. In the so-called palladium-catalysed cross coupling reactions, developed independently by Richard F. Heck, Ei-ichi Negishi, and Akira Suzuki, carbon atoms are made to come together on a palladium atom, whereupon their proximity to one another kick-starts the chemical reaction. The three scientists have been awarded the Nobel Prize in Chemistry for 2010 for their work. Heck (79) is a professor emeritus at the University of Delaware, now living in the Philippines; Negishi (75) is a chemistry professor at Purdue University in West Lafayette, USA; and 80-year-old Suzuki is a retired professor from Hokkaido University in Sapporo, Japan.

The palladium-catalysed cross-coupling reaction is unique since it is possible to carry it out under mild conditions and with very high precision. Previously, chemists had to use reactive substances and high temperatures to start the chemical reaction to join two carbon atoms. But as mentioned earlier, such methods led to the creation of unwanted by-products. When chemists want to create large molecules they build up the molecule in several steps. Production of too much unwanted by-products in each step, often left too little material to work with.

For joining carbon atoms, chemists need to first activate the carbon atoms and make them more inclined to react with another carbon atom. Victor Grignard, Nobel Laureate in Chemistry in 1912, found a solution to this problem. Using various chemical tricks he coupled a magnesium atom to a carbon atom that he wanted to make more reactive.

“Learning Science”

The Grignard reaction, which uses a carbon-magnesium compound, is one of the characteristic reactions especially useful as a means of forming new carbon-carbon bonds. The Grignard method of coupling carbon atoms has been enormously important in chemistry. But when it comes to creating large and complex molecules, the method has its limitations. The carbon atom in the unstable Grignard reagent does not behave predictably. When the reagent has several different carbon atoms to react with, too many unwanted by-products are created. The palladium-catalysed cross-coupling reaction solves this problem and provides precision in the process.

When palladium is used as a catalyst, it provides a setting that allows carbon atoms or compounds with carbon in them to come together for bonding, acting like a matchmaker. Once close enough, the carbons form their own attachment and drop the palladium, enabling the catalyst to produce more such pairings. Thus palladium takes part in and facilitates the process, but is not itself consumed.

Palladium-catalysed cross coupling is used in research worldwide, as well as in the commercial production of pharmaceuticals and molecules used in the electronics industry. The materials that can be produced using palladium-catalysed reactions range from carbon-based polymers such as styrene used to make plastics to organic compounds that can emit light, enabling thin television screens or computer monitors. However, the processes find their widest application in synthesising medicinal compounds, especially anti-cancer drugs.

In fact, one of the most notable applications of the palladium-catalysed cross-coupling reaction was for the synthesis of the anti-cancer compounds called 'discodermolide', which was first discovered in the marine sponge *Discodermia dissoluta* in the Caribbean Sea. In the marine sponge discodermolide is found only in minute quantities, and the natural source would have never been enough to meet the demand for its medicinal use. Using the palladium-catalysed cross-coupling reaction, scientists can now artificially produce discodermolide. Negishi's variant of the reaction was used as a central step in its synthesis. Other scientists have subsequently optimised the process and managed to obtain sufficient quantities of discodermolide to begin clinical testing on humans suffering from cancer.

Richard Heck was working for an American chemical company in Delaware, when he began experimenting with using palladium as a catalyst. In 1968 he published his successful work in a series of scientific papers including one describing addition of methyl and phenylpalladium halides to olefins at room temperature. A further step allowed the unprecedented alkylation of an olefin. Among other things, he was able to link a ring of carbon atoms to a shorter fragment of carbon in order to obtain styrene, a major component in the plastic polystyrene. Four years later he had further developed his reaction which has come to be known as the 'Heck reaction' and is one of the most important reactions for creating single bonds between carbon atoms. For instance, it is used in large-scale production of the anti-inflammatory drug Naproxen, the asthma drug Montelukast, and to produce a substance used in the electronics industry.

In 1977, Ei-ichi Negishi developed a variant of the Grignard reagent when he substituted zinc for magnesium. He investigated the palladium-catalysed cross-coupling of organometallic species with organohalides, eventually demonstrating that organo-zinc compounds could permit highly selective reactions under mild conditions and in the presence of a range of functional groups. The carbon atom becomes less reactive when using zinc, but the zinc atom transfers the carbon atom to the palladium atom. When the carbon atom subsequently meets another carbon atom on the palladium atom, then they can easily bond.

Two years later, Akira Suzuki used the element boron. It is the mildest activator so far and is even less toxic than zinc, which is an advantage when it comes to large-scale applications. For instance, Suzuki's reaction is used in the commercial synthesis of a substance that protects agricultural crops from fungi.

In subsequent years these reactions were improved and modified to become indispensable tools for the organic chemist and have been used to synthesise a range of complex natural products which would otherwise remain extremely difficult if not impossible to make. For example, the methods developed by the three scientists have been used to create new antibiotics that work on resistant bacteria and a number of commercially available drugs, including the anti-inflammatory drugs.

Today, it is estimated that no less than 25 percent of all chemical reactions in the pharmaceutical industry are based on these methods. Palladium-catalysed cross coupling has also been used by the electronics industry to make light-emitting diodes used in the production of extremely thin monitors. [Courtesy: Mr. Biman Basu, Dream 2047, January 2011, Vol.13, No. 4]

DR. SIDDHARTHA SEN

Professor Siddhartha Sen is a former Head of the School of Mathematics and founding Deputy Director of the Hamilton Mathematics Institute of Trinity College Dublin. Currently he is an Emeritus Fellow of Trinity and consultant for a research group in nanophysics. Professor Sen is a Member of the Royal Irish Academy and has a Sc.D degree from MIT. His research is in different areas of mathematical physics.

DR. RONALD G. PRINN

Professor Ronald G. Prinn is primarily an atmospheric scientist who has been studying various atmospheric gases to understand the atmospheric processes better. He is currently TEPCO Professor of Atmospheric Science, Department of Earth, Atmospheric and Planetary Sciences (EAPS) at Massachusetts Institute of Technology, Cambridge MA 02139, U.S.A.

Professor Prinn's research interests include the chemistry, dynamics, and physics of the atmospheres of the Earth and other planets, and the chemical evolution of atmospheres. He has been a faculty member at MIT since 1971, and headed the MIT Department of Earth, Atmospheric and Planetary Sciences from 1998 to 2003. He is currently involved in a wide range of projects in atmospheric chemistry and biogeochemistry, climate science, and integrated assessment of science and policy regarding climate change.

Prof. Prinn leads the Advanced Global Atmospheric Gases Experiment (AGAGE) network that measures rates of changes of the concentrations of trace gases involved in the greenhouse effect and ozone depletion. AGAGE is part of the powerful global observing system that has been measuring halocarbons, including bromocarbons, in the Earth's atmosphere continuously since 1978. The AGAGE is distinguished by its capability to measure over the globe at high frequency almost all of the important gases species in the Montreal Protocol (e.g. CFCs and HCFCs) to protect the ozone layer and almost all of the significant non-CO₂ gases in the Kyoto Protocol (e.g. HFCs, methane, and nitrous oxide) to mitigate climate change.

The scientific objectives of the AGAGE program are several in number and of considerable importance in furthering our understanding of a number of important global chemical and climatic phenomena. They include determination of the rate of emission and/or chemical destruction (i.e., lifetime) of the man-made chemicals such as chlorocarbons, chlorofluorocarbons (CFCs), and bromocarbons that contribute most of the reactive chlorine and bromine released into the stratosphere and/or are strong infrared absorbers, contributing to global warming.

Prof Prinn is pioneering the use of inverse methods, which use such measurements and three-dimensional models to determine trace gas emissions and understand atmospheric chemical processes, especially those processes involving the oxidation capacity of the atmosphere. He is also working extensively with social scientists to link the science, economics and policy aspects of global change. He has co-lead the development of a unique integrated global system model coupling economics, climate physics and chemistry, and land and ocean ecosystems, which is used to estimate uncertainty in climate predictions and analyse proposed climate policies.

Prof. Prinn has made significant contributions to the development of national and international scientific research programs in global change. He served as one of the Lead Authors in the Fourth Assessment of the Intergovernmental Panel on Climate Change (IPCC) published in 2007.

DR. N. MOHILAL MEITEI

Dr. N. Mohilal Meitei is presently serving as Associate Professor of Parasitology in the Department of Life Sciences, Manipur University, Imphal, India. He did his Ph.D. on the Soil and Parasitic Nematodes of Manipur. During his Student days he was the president of several Student bodies including All Manipur Students' Union. He has taught in several Schools and Colleges in Manipur before entering the University. He has widely travelled within India in pursuit of his scientific work and participated in many national and international conferences, seminars, workshops etc. He is member and Fellow (FNSI, FSSc.) of several learned Societies of India. He has extensively worked in Nematode and Protozoan Taxonomy including soil and plant parasitic nematodes and protozoans of fishes and some invertebrates, Host-Parasite relationships, Parasite management, Biological Control and described a number of species new to science. He has to his credit 95 research articles published in national and international journals of repute, 9 chapters in books, two books, two monographs and several miscellaneous publications. He took active part in several Academic Committees of Manipur University and is presently the Co-ordinator, INSPIRE Camps, Manipur University under the Innovation in Sciences Pursuit for Inspired Research Programme of the Department of Science and Technology, Government of India. He is also taking an active part in Environment Awareness Campaigns and is presently acting as Member Secretary, DIMC, Imphal West, Eco – clubs, National Green Corps, an innovative programme under the Ministry of Environment and Forest, Government of India.

“Learning Science”

DR. MANJU RAY

Dr. Manju Ray is presently the Emeritus Professor, CSIR at Bose Institute, Kolkata. She has a long association with the Department of Biological Chemistry, IACS, Kolkata. She did her M.Sc. in Physiology in 1969 and Ph.D in Biochemistry in 1975 from Calcutta University. In her academic career, she has received several awards/fellowships like INSA Young Scientist Medal in Biological Science in 1975 and Shanti Swarup Bhatnagar Prize in Biological Science in 1989. Her current research interest includes Molecular Enzymology and Cancer Biochemistry. Her future plan focuses on development of anticancer drug and understanding of differentiation process of cells.

SHRI SAMAR BAGCHI

Shri Bagchi is the former Director of National Council of Science Museums of India and other 5 science museums in eastern India were also under his jurisdiction. He is connected with a lot of science popularization & educational institution as effective board member. He has organized the popular science quiz program “Quest” in Doordarshan from 1983 – 88. He has got National Award for his contribution in Science Popularization through Mass Medium in 1992. He is the member of executive community and National Council for Science and Technology Communication, Department of Science & Technology, New Delhi. He is also an Environmental & Social activist in West Bengal.

DR. PAROMITA ROY

Dr. Paromita Roy did her Bachelors in Psychology (with special paper in family counseling), as well as in Masters in Industrial Psychology and Organizational Behavior from Delhi University. She received her PhD from Delhi University in Clinical Psychology and worked in the field of cognitive deficits in schizophrenia from Delhi University. Dr. Roy has extensive field experience in the area of clinical psychology. Her expertise is in educational psychology, soft skill training, human resource development, curriculum planning, strategy development, pedagogy, teacher training and student counseling. She has been with JBNSTS since 1993. Her focus is on educational paradigms with a socio-holistic view. With her long experience with creative science students and teachers, she has been instrumental in designing tailor made science enrichment programs.

DR. SOUMEN KR. ROY

Prof. Roy did his M.Sc. from Calcutta University in 1970. He was associated with SINP from 1971-72 during the time of his Post M.Sc. He received his PhD from Cambridge University in 1981. He was the professor of dept. of physics at Charuchandra College from 1974 to 1982.

SHRI RINTU NATH

Shri Rintu Nath is a senior scientist with Vigyan Prasar, an organisation under the Department of Science and Technology. He is the Head of the Division of Information Systems of Vigyan Prasar. As a professional Engineer, he is interested in the field of data acquisition system and communication techniques. He is actively involved in developing and disseminating innovative open ended science experiments for joyful learning by students. He is also a popular science writer and regularly writes for a number of magazines and journals.

DR. ABHIJIT KAR

Dr. Abhijit Kar received his Ph.D (Science-Chemistry & Material Science) from Jadavpur University. Dr. Kar carried out his post doctoral research in different parts of the world e.g., South Korea, Switzerland etc. He has also worked as visiting scientist at Ruhr Universität, Germany. His current research interest includes application of nanotechnology for micro-electronics, thin film and nanomultilayer structure for advanced materials. He has expertise on different materials characterization using electron microscopic techniques and simulating materials property. He has published 33 research papers in SCI Journals and authoring book chapter on Transmission Electron Microscopy. He serves as reviewer of many International Peer Reviewed Journals and Editorial Board Member of Journals from Science Publishing group. He is recipient of National Scholarship, CSIR SRF, Scientist Fellow-CSIR etc. He is also the recipient of National Scholarship He has been honoured as most distinguished person by Marquis Who's Who in the world, USA-2008. He is currently working as Scientific Officer of JBNSTS and looking after different academic and research activities and laboratory set up of JBNSTS.

DR. SMARAJIT MANNA

Dr. Smarajit Manna is currently the Student adviser, JBNSTS. He got his Ph.D degree from Jadavpur University. His area of research interest is biophysics more precisely the dynamics of cell membranes including ion channels. He has six research publications in international journals. He loves to pursue research as well as to interact with the students.

DR. SUBHRANGSU ADITYA

Subhrangsu Aditya, M.B.B.S., senior JBNSTS scholar (1995) is currently pursuing his research at School of Bio Science & Engineering, Jadavpur University. Besides, he is associated with School of Cognitive Science (formerly Center of Cognitive Science), Jadavpur University as a research assistant and guest faculty for the M. Phil. course in Cognitive Science. He is also associated with various workshops, seminars and other activities conducted by Center for Counselling and Studies in Self-Development Skills, Jadavpur University (CCSSS-JU). He is an associate member of SAMIKSHANI Centre for Psychoanalytical Studies and Mental Therapy (since 2009). He has publications in various international journals (such as *International Journal of Artificial Intelligence and Soft Computing*, 2012; *International Journal of Computational Vision and Robotics*, 2009) and conference proceedings (such as *2010 IEEE Students' Technology Symposium; International Joint Conference on Artificial Intelligence: IJCAI – 07*, 2007; *International Workshop on Spatial Issues in Language and Vision: SLIV - 05*, 2005) and book chapters (such as “Ethical Issues in Mental Health Services from Consumers' Perspective” published in the book *Ethical Issues in Mental Health Services*, 2009; “Determinants of Perception: A Neurophysiological Perspective” published in the book *Determinants of Perception*, 2009). He participated as a resource person in the UGC Sponsored Refresher Course “*Art and Science of Mechatronics and its Application in Robotics*” held at Electrical Engineering Department, Jadavpur University. He was invited to present a paper entitled “Protecting Children in Cyberspace” presented at the *Institute of Engineers (India)*, West Bengal State Centre, on the *World Telecommunication and Information Society Day*, May 17, 2009. His current areas of interest are Cognitive Neuroscience, Artificial Intelligence, Bio signal processing, Psychological Counselling, Stress Management, Cyber-relationship, Jealousy etc.

DR. B. B. BHATTACHARYA

Dr. Bimalendu Bhusan Bhattacharya did his B.Sc. (Physics) and M.Sc. (Geophysics) from Banaras Hindu University and Ph.D (Physico-Mathematical Sciences) from Leningrad State University, USSR (Presently St. Petersburg University, Russia). His some of the major research interests is Geoelectromagnetism, Mining Geophysics, Engineering Geophysics, Environmental Geophysics and Interpretation of Geophysical Data using Nonlinear Inversion, Computer Simulation and Modeling. He has done pioneering work during Indian Antarctica Expedition as leader. He has worked as Scientist in National Geophysical Research Institute (NGRI), Hyderabad and Director in Indian School of Mines (ISM), Dhanbad. Currently he is Emeritus Professor (CSIR Emeritus Scientist) and INAE Distinguished Professor in S. N. Bose National Centre for Basic Sciences, Kolkata. He has worked different parts of the globe and held distinguished positions such as Visiting Professor, Department of Physics in University of Alberta Edmonton, Canada, Leader, Fourth Scientific Indian Antarctica Expedition, Government of India; Visiting Professor (Fulbright) Department of Geology & Geophysics in University of Wisconsin, Madison Wisconsin, USA and Guest Faculty in Bengal Engineering and Science University, Sibpur, Howrah, W.B. Among many distinguished awards, he has got National Mineral Award, Dept. of Mines, Govt. of India, Distinguished Service Award Indian School of Mines, Dr. Coggin Brown Gold Medal on Earth Sciences, MGMI; Decennial Award, Association of Exploration Geophysicists, ect. He is Member of the Editorial Committee of The Journal of Geological Society of India, Recipient of Distinguished Professor's Chair by Indian National Academy of Engineering (INAE).

“Learning Science”

Day to Day Program

Day 1 : Friday, January 04, 2013

- 09:30 a.m. – 10:00 a.m. Registration
10:00 a.m. – 11:30 a.m. Welcome Address by the Director, JBNSTS and Orientation
11:30 a.m. – 12:00 noon **Discussion for Project Presentation**
12:00 noon – 01:00 p.m. **“An Inspiring Scientist I Knew”**
Dr. Partha Ghose, Senior Scientist Platinum Jubilee Fellow, National Academy of Sciences, India; Bose Institute, Kolkata
01:00 p.m. – 01:45 p.m. Lunch & Interaction (**Submission of attested copy of Xth Standard Board Examination Mark Sheet & Students' Information Sheet**)
01:45 p.m. – 02:15 p.m. **“BCL Forum”**
Ms. Aparna Bhattacharya
Manager, Projects Library Services East India, British Council Library
02:30 p.m. – 03:30 p.m. **Interactive Session**
Dr. Ei Ichi Negishi, Professor, Department of Chemistry, Purdue University, USA
03:30 p.m. – 05:00 p.m. **“Space in Mathematics”**
Prof. Siddhartha Sen, School of Mathematical Science, University of Dublin, Ireland

Day 2 : Saturday, January 05, 2013

- 09:30 a.m. – 10:00 a.m. Registration
10:30 a.m. – 01:00 p.m. **“Educational Visit at Science City”**
01:00 p.m. – 02:00 p.m. Lunch & Interaction (**Submission of filled-in BCL Membership Form**)
02:00 p.m. Onwards **Interactive Session**
Dr. Ronald Prinn, Director, Centre for Global Change Science
Massachusetts Institute of Technology, USA

Day 3 : Sunday, January 06, 2013

- 09:30 a.m. – 10:00 a.m. Registration
10:00 a.m. – 11:30 a.m. **“The World of Parasites”**
Dr. N. Mohilal Meitei, Associate Professor, Department of Life Sciences
Manipur University, Imphal, Manipur
11:30 a.m. – 01:00 p.m. **“Cancer & Ancient Disease: Modern Treatment”**
Dr. Manju Ray, Emeritus Professor, CSIR, Bose Institute, Kolkata
01:00 p.m. – 02:00 p.m. Lunch & Interaction
02:00 p.m. – 05:00 p.m. **“Demonstration of Science Experiment”**
Shri Samar Bagchi, Science Communicators' Forum, Kolkata
03:30 p.m. – 05:00 p.m. **“Parents' Counseling”**
Dr. Paromita Roy, Deputy Director, JBNSTS

Day 4 : Monday, January 07, 2013

- 09:30 a.m. – 10:00 a.m. Registration (**Submission of Travel Bill**)
10:00 a.m. – 11:30 a.m. **“Events that led to the birth of Quantum Mechanics”**
Dr. Soumen Kr. Roy, Professor, Dept. of Physics, Jadavpur University, Kolkata
11:30 a.m. – 01:00 p.m. **“Moments in Mathematics”**
Mr. Rintu Nath, Scientist 'E', Division Head: Information Systems & Laboratories
Vigyan Prasar, Noida, U.P.
01:00 p.m. – 02:00 p.m. Lunch & Interaction
02:00 p.m. – 05:00 p.m. **“Spectroscopy, Microscopy, Properties of Fundamental Elements”** –
Hands on activity at JBNSTS Laboratory – Dr. Abhijit Kar & Dr. Smarajit Manna

Day 5 : Tuesday, January 08, 2013

- 09:30 a.m. – 10:00 a.m. Registration
10:00 a.m. – 11:15 a.m. **“How to choose your career?”**
Dr. Subhrangsu Aditya, School of Bio Science & Engineering and School of Cognitive Science, Jadavpur
University, Kolkata
11:15 a.m. – 11:45 a.m. **“Policy Dialogue on Science & Mathematics”**
A Team of international delegate's (from U.K.) visit to JBNSTS and interaction
11:30 a.m. – 01:00 p.m. **“Exploration Antarctica: Science & Adventure”**
Dr. Bimalendu Bhusan Bhattacharya, INAE Distinguished Professor S. N. Bose National Centre for Basic
Sciences, Salt Lake, Kolkata
01:00 p.m. – 02:00 p.m. Lunch & Interaction (**Submission Feedback sheet, reimbursement of Travel Bill and BCL Card
Distribution**)
02:00 p.m. – 05:00 p.m. **Project Presentation**