UNIVERSITY OF MUMBAI- DEPARTMENT OF ATOMIC ENERGY

CENTRE FOR EXCELLENCE IN BASIC SCIENCES (CBS)

(http://www.cbs.ac.in)

S. M. Chitre

* **India is aspiring to be a leading knowledge power…**

can this be realized???

IDENTIFYING DRAWBACKS...

Nurturing talent...promoting excellence
मौलिक विज्ञान प्रकर्ष केन्द्र

i) Compartmentalized teaching and learning of a few sub-disciplines and lack of multi-disciplinarity of course structure.

ii) Inadequate laboratory facilities in schools and colleges providing hands-on laboratory training.

iii) Lack of exposure to research methodologies.

iv) Limited mobility between Science and Technology.

v) Major Initiatives were not linked academically with the university sector of the country.

Remedial Steps…

- Need for translating basic research into tomorrow's technology.

- Essential to establish a whole new ecosystem that will nourish innovative solutions.

- There should be accountability and academic audit of basic research done in Universities/ Laboratories.

- Encourage Refresher Courses for Teachers/ Faculty; Continuing education for teachers.

- Classroom instruction should be supplemented by study of Nature.

- Promote healthy Public – Private Partnership: Has the passion for the support and growth of Indian Science diminished in the past 50 years! Since the economic reforms in the early 1990s, private wealth has undoubtedly soared high, but one cannot help feeling that in the post- reform years, private initiative for major investments in Education has declined.

Need for radical changes and massive investments in the country's *higher education system*

GROWTH & DEVELOPMENT OF MODERN SCIENCE & TECHNOLOGY IN INDIA

is largely due to initiatives by visionary individuals who went on to build great institutions:

Dr. MAHENDRA LAL SIRKAR: a Physician from Kolkata who started Indian Association for the Cultivation of Science (1876).

Mr. JAMSETJI NUSERWANJI TATA established the Indian Institute of Science in Bangalore (1909)

PANDIT MADAN MOHAN MALAVIYA founded the Banaras Hindu University (1916)

SIR M. VISVESVARAYA: laid the foundation of modern technological in India (1920)

DR. HOMI J. BHABHA & MR. J. R. D. TATA shared the vision by establishing **cradle** of India's Atomic Energy programme, the Tata Institute of Fundamental Research, in Mumbai in 1945.

DR. VIKRAM SARABHAI established the Physical Research Laboratory, **cradle** of India's Space Programme in Ahmedabad (1947)

PANDIT JAWAHARLAL NEHRU was instrumental in starting the Indian Institutes of Technology is the country in 1950.

CLUSTERING PHENOMENA

- **The Royal Society in the 17th century England**
- **Rutherford's Cavendish of Cambridge**
- **Cluster of Astronomies**
- **Impressionist School**

At the turn of 20th century there was the whole blossoming of Science culture with Jagdish Chandra Bose, C. V. Raman, P. C. Ray, Satyendranath Bose, M. N. Saha, S. Ramanujan making phenomenally original contribution.

Widespread perception that Basic Science done in India is not relevant for technology!

Historically, Indian Science has spawned new technology but, ironically not within the country.

Eminent Indian Scientists

J. C. Bose : Microwaves in 1895:

Used microwave to ignite gunpowder and ring a bell at some distance without any mechanical or electrical contact in 1895.

Demonstrated use of EM radiation of 5-25 mm wavelength for sending communication signals through electromagnetic waves over distances of upto a mile in Calcutta without using any wires.

A century later J.C. Bose's work came handy for the ubiquitous Mobile phones, Remote Sensing, Satellite Communications… all emerging in the West, not in India!

C. V. Raman:

Established that the scattered light has a different frequency from that of the incident light (essentially, causing change of color) - provided a unique identify to tag any type of molecule.

Only 70 years after discovery of Raman spectroscopy that Raman Scanners are reaching the market capable of scanning for detecting a wide variety of molecules from Pathogens to Drugs.

S. Ramanujan:

Seminal work in Number theory of 1930s is finding applications for Cryptography, Computer Algorithms, Control Theory, Population Dynamics, Mobile Communication and even Theoretical Physics

Targeted Goal…

Nurturing talent…promoting excellence

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To provide a liberal and all round education…..

Center for Excellence in Basic Sciences (CBS)

RESTRUCTURING POST-HIGH SCHOOL SCIENCE EDUCATION

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- **Embedding Undergraduate Education in the midst of Post-Graduate Research environment on a university campus, with emphasis on the experimental component within Multi-disciplinary framework.**

- **CBS…not a stand-alone Centre like IISERs & NISER. Rather it is an autonomous entity in the University of Mumbai, academically linked with University Departments, & constituent Colleges and with proximate Institutes/ Laboratories/ Industries (e.g. TIFR, BARC, HBSCE, IITB)**

- **Providing** classroom lectures coupled with laboratory instruction in Basic Sciences & Humanities with a seamless curriculum in Mathematics, Physics, Chemistry, Life Sciences and Computer Science.

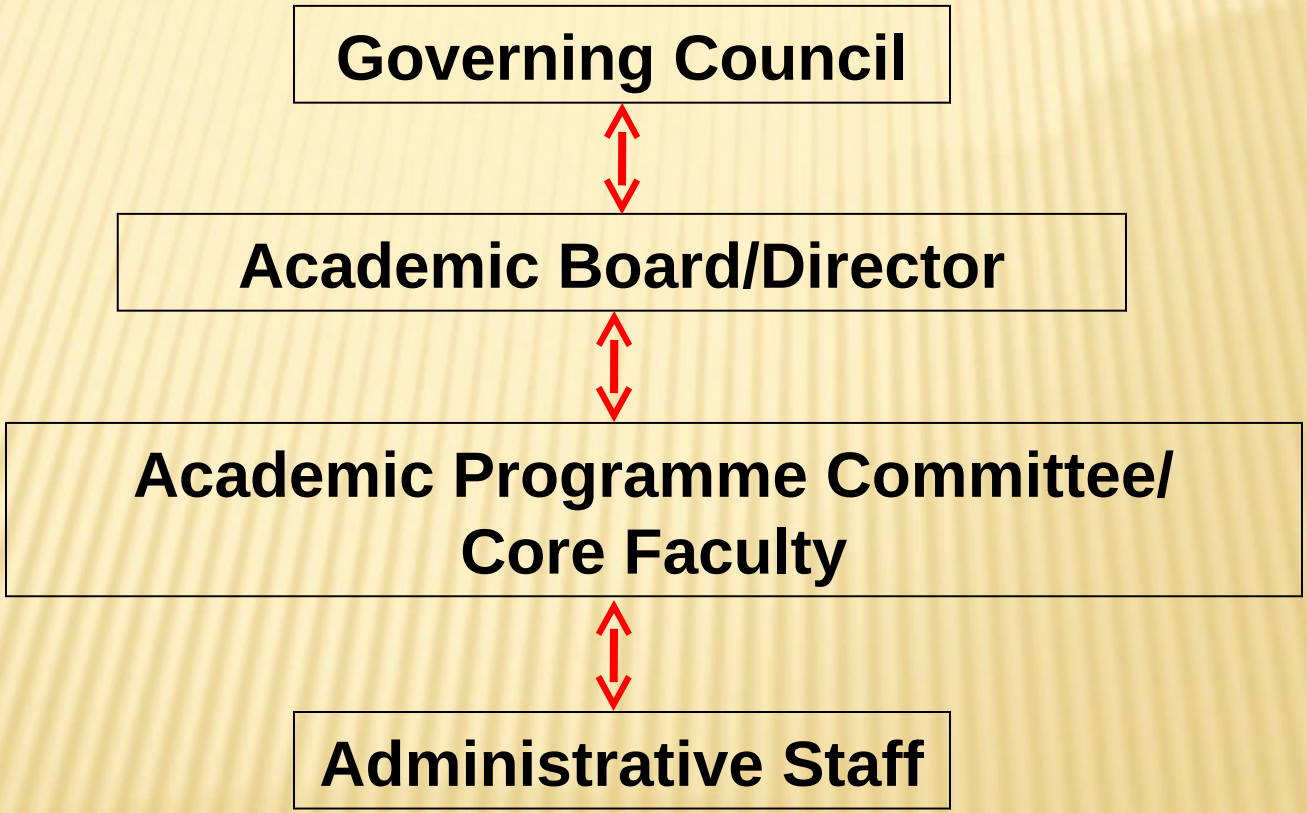
- **Adopting** a semester system with continuous evaluation, field trips, submission of homework assignments and encouragement to undertake projects in-house as well as in neighboring research laboratories.

- **Teaching and Research facilities are made available to students and faculty of Mumbai University.**

- **National-level Entrance Screening Test (NEST) held at over 30 nationwide centres for selecting students in various streams. Awarding scholarships and accommodation in hostels on the campus.**

- **5-year (Integrated) M. Sc. Degree to be awarded by the University of Mumbai.**

Structure of CBS



CENTRE FOR EXCELLENCE IN BASIC SCIENCES

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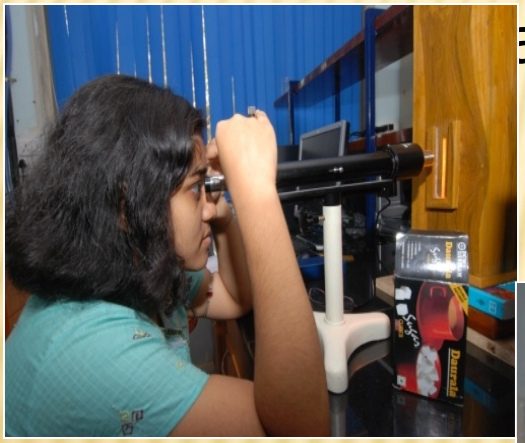
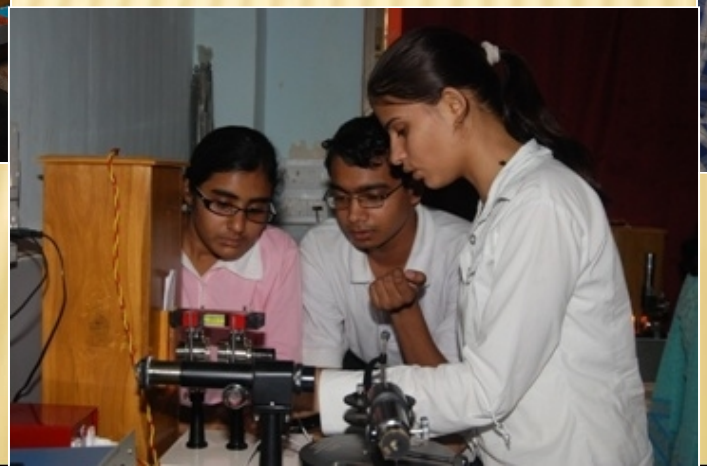
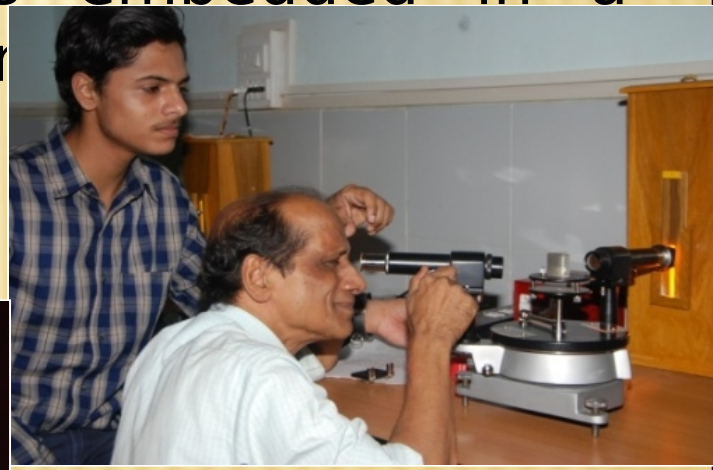
The Department of Atomic Energy (DAE), Government of India, and the University of Mumbai jointly launched in September 2007 a Centre for Excellence in Basic Sciences (CBS) that will offer high-quality undergraduate teaching which is embedded in a and research environ







CENTRE FOR EXCELLENCE IN BASIC SCIENCES

More about the integrated M.Sc. Course

 # Semester-based course structure.

 # Continuous assessment of students on the basis of regular tests, quizzes, assignments and mid-sem exams.

 # Regular laboratory visits and field trips.

 # Colloquium talks by eminent scientists and educationists.

Teachers drawn from proximate institutes:

- Bhabha Atomic Research Centre – BARC
- Homi Bhabha Centre for Science Education - HBCSE
- Indian Institute of Technology
- Tata Institute of Fundamenta Research – TIFR
- University of Mumbai – UM, and
- Neighboring colleges

Field Trips

In order to inculcate a broad interest in the basic sciences, students are taken on field trips and laboratory visits on a regular basis.

Tuesday afternoons have been designated for CBS Colloquium where eminent scientists and educationalists are invited to deliver a lecture in the broad area of science, engineering and technology and [illegible]ne interacting with the students.

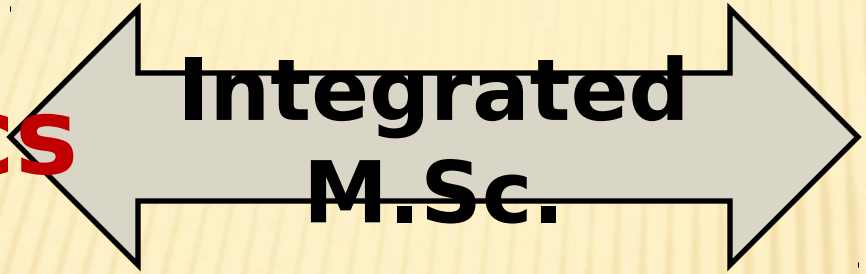
Field trip to Uran

Field trip to the Giant Meterwave Radio Telescope, Narayangaon

Stipend and other allowances

Students get a monthly stipend of Rs 3000/- per month and an academic allowance of Rs 2000/- per month. Book grant of Rs 6000/- per academic year.

Students can work on science projects, approved by CBS, in different institutions in India during their vacations



Biology & Chemistry streams in the pipeline!!!

WHY NOT A CENTRE FOR EXCELLENCE IN SOCIAL SCIENCES?– Liberal Education

Student Intake

Intake of students is based on NEST – National Entrance Screening Test.

Forms available at CBS, NISER, Bhubaneswar.

Forms can also be downloaded from www.cbs.ac.in

ANY QUERIES?...JUST ASK...OR WRITE TO US AT info@cbs.ac.in

FIRST BATCH OF STUDENTS

Student	Home town
Abhishek Pathak	Varanasi
Akash Suman	Patna
Amritansh Vats	Jharkhand
Deovrat Prasad	Ranchi
Dharmaj Soni	Gurgaon
Harsh Nayak	Chhattisgarh
Kedar Kolekar	Ratnagiri
Lavish Pabbi	Ludhiana
Mritunjay Kumar Verma	Ballia
Ninad Jetty	Mumbai
Parmeshwar Prasad	Chhattisgarh
Poonam Kumari	Ranchi
Rashi Verma	Dehradun
Renu Redhu	Haryana
Rohit Sharma	Indore
Shoumi Roy	Kolkata
Sitender Kashyap	Pune
Uday Mourya	Jabalpur
Varma Raja P.C. Shreekrishna	Calicut

IN PURSUIT OF EXCELLENCE...

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Developing a framework for Post-High School

Education
at

Centre For Excellence in Basic Sciences

- Paths of knowledge creation and knowledge application must intersect in order to make rapid strides in sustainable technological development in the country.

- Education and training should inculcate spirit of ***sustainable development*** to address such essential issues as:

- Food security
- Water resources & management
- Health care for all
- Energy conservation
- Clean environment and climate change
- Universal access to education
- Solar Energy

" The untapped scientific and technical knowledge available to India for taking is the economic equivalent of the untapped continent that was available to the US 150 years ago"

Milton Friedman (1955) in a report to Union Finance Minister

- Identify Dynamic & Visionary leadership for the Centre which may be stand-alone like IISER & NISER but selectively within university campuses.

- Attract the best faculty and establish most congenial facilities by combining teaching undergraduate world class research without any bureaucratic interference!

- Formulate a comprehensive curriculum of courses in Basic Sciences in a multi-disciplinary framework with adequate experimental component and balanced educational efforts in Science, Technology & Humanities.

- Besides the core faculty draw on the Adjunct & Visiting faculty from proximate Research Centres & Laboratories and strengthen academic links with University Departments and constituent Colleges.

- Admit manageable number of talented students from various strata of the society particularly targeting the non-urban centres in the country by conducting National Entrance Screening Tests at various centres.

-Invite huge numbers of post-doctoral fellows both Indian and Foreign who provide the backbone for productive Research in world class Institutions in advanced nations.


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Thank you....