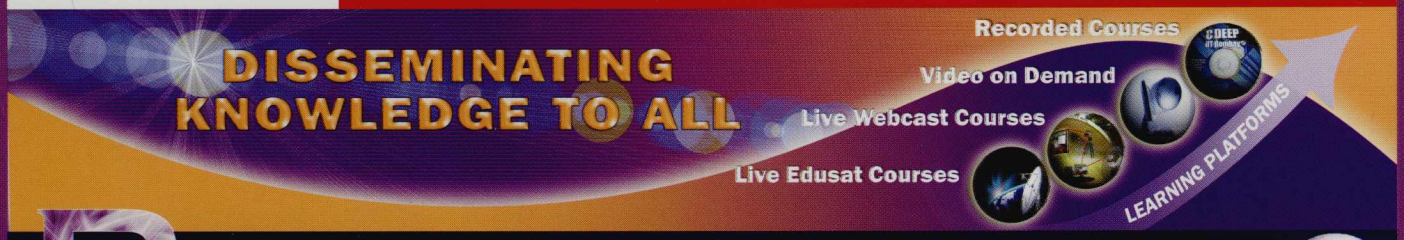
MARCH 2009 | Centre for Distance Engineering Education Programme



REACH OUT

A NEWSLETTER OF CDEEP, IIT BOMBAY
http://www.cdeep.iitb.ac.in

IITBombay
Golden Jubilee 2008
Tryst with Excellence

INSIDE THIS ISSUE

CDEEP's EDUSAT Courses

- Free for all institutes having a Student Interactive Terminal (SIT) of ISRO
- Interact live with IIT Bombay faculty
- Fifteen courses offered this semester (http://www.cdeep.iitb.ac.in/Live_edu/index.html)
- A Remote Centre (RC) of IITB may offer EDUSAT courses in four modes (http://www.cdeep.iitb.ac.in/Live_edu/mode.html)
- An RC may replace one of its courses with that of IITB, using the same assignments, quizzes and exams
- Participants may take a course in the Credit mode getting RC certification

National Knowledge Network: Concept, Design and Realisation

The convergence of IT and communication (often referred to as ICT), and the exponential growth in communication capacity opens up new vistas for dissemination of information and knowledge. When properly deployed, ICT has the potential to solve major challenges faced by the world today. Besides, ICT coupled with processing power is a potent instrument for any planning process. When properly harnessed, ICT can convert a society into a knowledge-based one. The National Knowledge Network(NKN) is an initiative in this direction to enable India to leapfrog into becoming a knowledge-based society.

Integration and synergy will enable scientists, researchers and students with different backgrounds in diverse regions to realize the true potential of India. NKN will catalyze knowledge sharing and knowledge transfer between stakeholders seamlessly – that too across the nation and globally. The benefits of NKN are expected to go beyond urban elitist groups, as the ambiance created by NKN is ubiquitous and globally unique. NKN will encourage research and educational institutions to create national intellectual assets. It is designed to inspire innovation and engage researchers in developing technologies that will uplift the quality of human life. Besides, NKN will enable the use of specialized applications that allow sharing of high-performance computing facilities, e-libraries, virtual classrooms, and very large data bases.

The architecture of the NKN is scalable. The network has an ultra high speed core (multiples of 10 gigabit per second), complimented with a distribution layer at appropriate speeds. The participating institutions at the edge shall connect to the NKN seamlessly at speeds exceeding 1 Giga bits per second (Gbps). NKN is a dedicated, owned IP-MPLS network based on multiple λ's of 10 Gbps in the core. The network architecture and governance structure shall allow the user institutions an option to connect to the distribution layer through a last mile connectivity bandwidth. The architecture allows for direct connections to the core, distribution, or edge, depending upon the state of readiness of the user institution. While the main emphasis of the NKN is on a strong and robust internal Indian network, i.e, intranet connectivity, so as to ensure that India is perceived as one country from the Himalayas to Kanyakumari, NKN is designed to handle applications that demand high bandwidth with low latency. In short, NKN is a reliable, robust, scalable, and secure network.

Applications such as country-wide classrooms will mitigate the systemic difficulties faced by planners in search of quality faculty and enhance the reach of education at all levels cutting across all barriers, viz, regional, religious, caste, economic, etc. The crux of the success of the NKN is related to education-related applications, databases and delivery of these to education-users on demand. Content creation and content sharing in all areas of science and technology including bio-technology and nano technology will be enabled for the purpose of education and research. NKN will thus allow the creation of focused workgroups across the country in critical areas as well as create opportunities for global interaction.

The benefits of NKN are varied. It presents an opportunity to create country-wide classrooms and common timetables, build a critical mass for collaborative research areas, overcome the language barrier, create universities without borders and laboratories without walls, share the knowledge of our specialists across the whole country, and as a result bring into being the *vasudeiva kutumbakam*, envisioned in our ancient scriptures for universal brotherhood.

Prof. S. V. Raghavan
Computer Science & Engg., IIT Madras
Chairman, Tech. Advisory Committee, NKN

DIRECTOR'S DESK

As IIT Bombay completes its fiftieth year and looks ahead, the biggest challenge is to find ways in which our intellectual capital can be used to solve national needs. One way is to enhance the level of engineering education in the country, a goal to which we are greatly committed. India educates approximately 7% of its young people in higher professional educational programmes and about 2.5% study engineering. To meet the rapidly expanding demand for education, it is necessary to take advantage of developments in communications technology so that education may be offered in the distance mode.

Anticipating these developments, distance education programmes were begun in IIT Bombay through the Centre for Distance Engineering Education Programme (CDEEP) whereby IIT Bombay's courses are disseminated to benefit students and faculty of engineering colleges as well as working professionals. Using state-of -the-art educational technologies, CDEEP has been transmitting live courses of IIT Bombay. It also makes available video recordings of these classroom lectures. This not only preserves the knowledge of our faculty for posterity but also provides a true classroom environment for users of these programmes.

CDEEP has also been associated with the the NPTEL scheme of the Ministry of Human Resources Development, GOI, whereby the IITs and IISc together developed curriculum-based engineering course content. Today, the number of high-class courses available in this programme forms one of the largest collections of technical courses available anywhere. With active support of the GOI, it has been possible to produce these at very affordable costs.

Distance education of this type is the answer to India's needs for technical manpower as it empowers citizens to enrich and uplift themselves with technical knowledge from the best available sources.

Prof. Devang V. Khakhar
Director, IIT Bombay

CDEEP'S RECORDED COURSES

CDEEP has recorded a number of IIT Bombay's courses. These comprise mostly live classroom lectures and each course contains approximately 35-40 hours of instruction. These courses are available on VCDs/DVDs and may be purchased by institutions for a nominal amount. For more details, please visit http://www.cdeep.iitb.ac.in/rec_courses.html

Given below is the first part of this list. The remaining courses shall be given in succeeding issues of Reach Out.

No.	Course name	Course Instructor	Discipline
1.	Structural Analysis	Prof. P. Banerjee	Civil Enginnering
2.	Earthquake Preventive Measures in House Building Business	Faculty of Civil Engg.	Civil Enginnering
3.	Fluid Mechanics	Prof. T. I. Eldho	Civil Enginnering
4.	Finite Element Methods	Prof. Tarun Kant	Civil Enginnering
5.	Engineering Mechanics	Prof. Deepankar Choudhary	Civil Enginnering
6.	Soil Mechanics	Prof. B. V. S. Vishwanadham	Civil Enginnering
		Prof. G. Venkatachalam	Civil Enginnering
7.	Numerical Methods	Prof. Tarun Kant	Civil Enginnering
8.	Environmental Geotechnology	Prof. D. N. Singh	Civil Enginnering
9.	Risk Assessment Management in Geotechnical Engg.	Prof. D. S. Murthy	Civil Enginnering
10.	Advanced Geotechnical Earthquake Engg.	Prof. Deepankar Choudhary	Civil Enginnering
11.	Introduction to Geotechnical Earthquake Engg.	Prof. Deepankar Choudhary	Civil Enginnering
12.	Soil Mechanics - I	Prof. Ashish Juneja	Civil Enginnering
13.	Introduction to Chemical Engg.	Prof. Madhu Vinjamur	Chemical Engineering
14.	Chemistry	Prof. Murugavel R	Chemical Engineering
15.	Digital Control	Prof. Kannan Moudgalya	Chemical Engineering
16.	Instrumentation & Process Control	Prof. Kannan Moudgalya	Chemical Engineering
17.	Introduction to Biochemical Engg.	Prof. K. V. Venkatesh	Chemical Engineering
18.	Chemical Process Design	Prof. Sanjay Mahajani	Chemical Engineering
		Prof. Sharad Bhartiya	Chemical Engineering
19.	Advanced Transport Phenomena	Prof. Hemant Nanavati	Chemical Engineering
20.	Artificial Intelligence (UG)	Prof. P. Bhattacharya	Computer Science & Engg.
21.	Information Systems	Prof. D. B. Phatak	Computer Science & Engg.
22.	Design & Analysis of Algorithms	Prof. Abhiram Ranade	Computer Science & Engg
		Prof. S. Viswanathan	Computer Science & Engg.
23.	Software Engineering	Prof. S.A. Kelkar	Computer Science & Engg.
		Prof. R. K. Joshi	Computer Science & Engg.
		Prof. Umesh Bellur	Computer Science & Engg.
		Prof. N. L. Sarda	Computer Science & Engg.
24.	Computer Programming & Utilization	Prof. S. Sudarshan	Computer Science & Engg.
25.	Object Oriented System	Prof. R. K. Joshi	Computer Science & Engg.
26.	Artifical Intelligence (PG)	Prof. P. Bhattacharyya	Computer Science & Engg.
27.	Advanced Programming in C++	Prof. S. Biswas	Computer Science & Engg.
28.	Language Technologies on the Web	Prof. P. Bhattacharyya	Computer Science & Engg.
29.	Mobile Computing	Prof. Sridhar Iyer	Computer Science & Engg.
30.	Electronic Design	Prof. Anil Kottantharayil	Computer Science & Engg.

COURSES FOR YOU

Advanced Process Control (CL 686)

The performance of chemical and biochemical process systems, such as those involving crude refining and pharmaceutical manufacturing, need to be monitored and optimized on a continuous basis. This enables these manufacturing systems to operate consistently in a safe, stable and profitable manner.

Optimization and control of such processes involve translating some of the business objectives defined at an enterprise level over a period of time, and then bringing them down to the manufacturing level so as to ensure adherence of the manufacturing system to the desired goals. While it is desirable to continuously monitor this adherence, the overall complexity of the system (both spatial and temporal) poses significant challenges and makes it necessary to decompose the control tasks.

Spatial and temporal decomposition approaches have been deployed for enabling productivity enhancement of such manufacturing units. Spatial decomposition partitions the overall manufacturing system into simpler sub-systems whose performances are relatively easy to analyze. The performance of the overall system is optimized by a peer-to-peer co-ordination of these sub-systems. On the other hand, temporal decomposition involves a hierarchical partitioning on the basis of time-scales. Faster sub-systems receive targets from upper, relatively slower layers that are defined over longer horizons. These sub-systems seek to achieve their targets using local control approaches.

Productivity enhancement through the above approaches is crucially dependent on modeling the cause-effect relationships- high fidelity models are most important. Moreover, the availability of numerically robust model solving and optimization approaches is critical to the overall success of the productivity enhancement framework.

CL 686 Advanced Process Control aims to teach the above concepts using a bottoms-up approach. Regular feedback control is first reviewed and is followed by advanced schemes that overcome some of the limitations of the traditional ones. Next, accurate cause and effect relationships (models) are developed via system identification approaches. This is followed by the development of long range predictive control methodologies that use these dynamic models. Aspects related to stability, robustness and performance are dealt with in a theoretical manner.

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ENTREPRENEURSHIP CELL

Starting a new company is never an easy task. To lighten the burden, the Entrepreneurship Cell (E-Cell) of IIT Bombay not only wants to give novice entrepreneurs a hand, but is pushing for students and young professionals to take the plunge. Now into its eleventh year, E-Cell is managed by students. It organizes various programmes like business-plan competitions, lectures and workshops to foster entrepreneurship.

E-Summit is one of the initiatives to bring together aspiring entrepreneurs, start-ups, successful entrepreneurs, venture capitalists and academicians to interact and help build successful enterprises. *E-Summit 2009*, that concluded on 7th February, hosted *Investor Pitch*, a platform for novice entrepreneurs to showcase their business plans in front of a panel of reputed venture capital firms for seed funding.

It also played host to the finals of *Eureka! 08*, the biggest business-plan competition in Asia. This programme has already seen the establishment of 35 successful startups, and is open for students and working professionals from all over the world who wish to convert their ideas into successful enterprises. *Eureka! 08* received more than 2000 entries across sectors ranging from telecommunication to hospitality. Competing for cash prices worth Rs. 21 lakh, the winners also get access to venture capital, intensive mentoring and incubation facilities. During this year, a special category was introduced to encourage startups in the field of clean/ sustainable technology.

The *Global Entrepreneurship Network*, an integrated support system for young entrepreneurs, is another venture of E-Cell. Here individuals can post a brief summary of their business idea and get access to funding and other resources for starting an enterprise. They may also be mentored by eminent corporates. The network currently consists of entrepreneurship-promoting organizations of premier colleges (including IITs and IIMs) in India and abroad.

In line with its mission to spread the spirit of entrepreneurship, E-Cell also conducts *Entrepreneurship Campaigns* that organise workshops and lectures across the country. This programme also provides assistance and guidance towards starting similar organizations in other colleges.

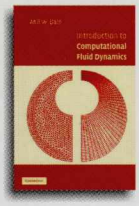
So, if you have a bright business idea which you think has a future, just visit http://www.ecell.in and help is at hand.

USEFUL LINKS

IIT Pombay homepage	: http://www.iitb.ac.in
Web address of CDEEP	: http://www.cdeep.iitb.ac.in
Web address of NPTEL	: http://www.nptel.iitm.ac.in
All Courses of IIT Bombay	: http://www.cdeep.iitb.ac.in/courses
Live Webcast Courses	: http://www.cdeep.iitb.ac.in/solo
Live Edusat Courses	: http://www.cdeep.iitb.ac.in/Live_edu/index.html
CDEEP's Recorded Courses	: http://www.cdeep.iitb.ac.in/rec_courses.html
National Mission on Education	: http://www.sakshat.in

BOOKSHELF

Introduction to Computational Fluid Dynamics



Anil W. Date
Cambridge University Press, 2005
398 pages
ISBN 0521 853265

Prof. A.W. Date's book titled *Introduction to Computational Fluid Dynamics* offers a fresh approach to solving fluid flow problems. The goal of Computational Fluid Dynamics (CFD) is to solve for the pressure and velocity fields of a fluid flow problem. It is well known that the pressure field can have spurious oscillations if pressure and velocities are defined at the same grid location. While various remedies have been proposed by researchers, Prof. Date has provided fresh insight into this phenomenon by applying thermodynamic concepts to discrete equations for fluid flow. Based on that insight, he has formulated a new algorithm to solve fluid flow problems and this forms the basis of his book. The framework provided is such that prior pressure–based techniques for fluid flow can be identified as special cases of the general approach presented in this book.

The chapters are organized to systematically build up the complexity of the problem – beginning from 1D conduction onto solving fluid flow in complex geometries. The book is unique for developing discretized equations not only for implementation on Cartesian grids but also for curvilinear and unstructured grids. It is self-sufficient and particularly convenient for new students since it provides derivations of transport equations, provides a CFD code, and has many interesting problems for practice. From a practitioner's perspective, this book covers crucial topics on numerical grid generation and convergence enhancement techniques – both topics that are typically not covered adequately in competing CFD textbooks.

There are special chapters devoted to boundary layer flows and phase change problems. There is good coverage of high and low Reynolds number k– model of turbulence, mass transfer and combustion problems, and over 135 exercise problems. A comparison of experimental data with numerical results is also provided where possible. This is very useful to assess the application of CFD as a tool for realistic problems.

In summary, this book is not only ideal for students new to the topic but also serves as a good reference guide for seasoned practitioners of CFD in academia and industry.

Prof. Neelesh A. Patankar
Dept. of Mechanical Engg.
Northwestern University, USA

Q & A

1. Do you transmit the same courses every semester?

No, courses change every semester. This semester, there are 27 courses from 9 disciplines.

2. Can I view webcast courses for free?

Visit http://www.cdeep.iitb.ac.in/solo and register to see the free webcasts at the scheduled time.

3. Can I be evaluated for a subject?

Join the Credit mode and get a grade certificate from a Remote Centre. For details visit http://www.cdeep.iitb.ac.in/Live_edu/mode1.html

PROFILE

Prof. S.D. Agashe

Prof. Sadanand Dinkar Agashe obtained his B.E.(Electrical Engineering) degree from the University of Bombay in 1961, and his M.S. and Ph.D. degrees, both in Electrical Engineering, from the University of Illinois, Urbana-Champaign, Illinois, USA, in 1963 and 1967 respectively.

On his return to India, Prof. Agashe joined the faculty of the Indian Institute of Technology Kanpur. In December 1973, he moved to the IIT Bombay, where he is currently Emeritus Fellow. He has been the Head of the Department of Electrical Engineering, and Chairman GATE, at IIT Bombay. He spent one year, 1970-71, at the Computer Group of the Tata Institute of Fundamental Research, Bombay.

Over the last 32 years or so, Prof. Agashe has taught various subjects in Electrical Engineering, such as Basic Electric Circuits, Network Theory, Control Systems, Applied Linear Algebra, Multivariable Control, and Optimal Control. He has also taught subjects outside Electrical Engineering, such as Logic and Foundations of Mathematics, and History and Philosophy of Science. Prof. Agashe is grateful for the academic freedom he has enjoyed at IIT Bombay that allowed him to pursue his varied academic interests.

In his lectures, Prof. Agashe likes to bring out the connections, some well-known and some quite unexpected, between various subjects. He has been pursuing foundational studies, resulting in a paper on an extension of the well-known Routh Algorithm, and another on 'Characterization of the Laplace Transformation', that is of very basic importance in Linear System Theory, and more recently, in a paper completing Einstein's classic 1905 work on the Special Theory of Relativity. He has been trying to bring about an integration between various subjects, at least in the minds of teachers, even at the school level. His NPTEL course of lectures on Conrol Engineering has got a very encouraging response through YouTube.

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