MAY 2008

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

Second List of IITB Remote Centres

The first list appeared in Reach out, March'08

- Jaipur Engg. College, Jaipur
- Vellore Institute of Technology, Vellore
- K.J.Somaiya College of Engg., Mumbai
- Rajarambapu Institute of Tech, Rajaramnagar
- MGM College of Engg., Kamote, Navi Mumbai
- Goa Engg. College, Goa

For in-house employees only:

- Tech Mahindra, Mumbai
- Tech Mahindra, Pune
- Tech Mahindra, Noida
- Tech Mahindra, Kolkata
- Tech Mahindra, Bangalore

CDEEP Courses - Perception of IIT Bombay Students

IIT Bombay has been transmitting a small fraction of its courses through satellite and web. This activity cannot be scaled up without the cooperation of faculty and students. The major concern to be overcome is whether simultaneous live reception of our courses at the remote centres lowers the efficacy of learning at IIT Bombay.

To address this concern, we carried out a pilot study to determine the perception of students at IIT Bombay. 255 students of eight satellite- transmitted courses and 63 students of three webcast courses participated in the survey. The courses were at all levels: B.Tech, M.Tech and Ph.D.

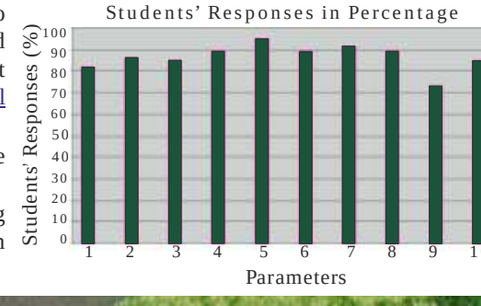
We had requested our faculty members to actively support the learning process through Moodle, the learning management system used at IIT Bombay (see the March issue of Reach Out for the possible uses of Moodle). The faculty members cooperated and made optimum use of Moodle by posting instructional material, assignments, exam questions and their solutions, as well as by promoting the dicussion forum for students. Also, the lectures were presented using various visual aids. Since these courses were recorded, they were available as Video on Demand (VOD) and could be seen by students any number of times.

The objective of this pilot study was to find out whether students at IIT Bombay consider the courses delivered through CDEEP to be good and worthy of transmission and storage, and to be at least comparable to the courses delivered in the traditional mode in regular classrooms. Another objective was to determine the efficacy of using Moodle and VOD. A report on this study is available at http://www.cdeep.iitb.ac.in/report.html
We summarize the findings:

1. 82% of respondents agree that Moodle prepares them better for examinations.
2. 86% of respondents find that reading discussions on Moodle help in understanding the content better.
3. 85% of respondents consider Moodle an important learning platform.
4. 89% of respondents agree that more courses should use Moodle.
5. 95% of respondents find that VOD is an effective tool to understand a course.
6. 89% of respondents find VOD a flexible learning tool.
7. 91% of respondents feel VOD enables them to go through missed lectures at their own convenience.
8. 89% of respondents agree that more lectures should be available on VOD.
9. 73% of respondents feel that the lecture delivery is better through CDEEP as compared to the traditional mode.
10. 85% feel that visual aids help in better understanding of the course.

The pilot study suggests that Moodle is an interactive and resourceful learning platform. The quality of CDEEP lectures is better than the traditional mode of delivery. Visual aids used during CDEEP courses reinforce learning and VOD is a flexible learning tool.

We conclude that it is possible to have excellent delivery of courses by using the facilities available at CDEEP. Thus, IIT Bombay students could actually support the simultaneous transmission of their courses. This is brought out by their demand that Moodle and VOD be available for other courses. However, active and enthusiastic participation of IIT Bombay instructors is indispensable for similar success in other courses.



COEP'S EXPERIENCE IN DISTANCE EDUCATION

Compared to traditional learning programmes, distance education has, over the years, been relegated to the background. This has largely been due to the absence of facilitities for live two-way communication between the teacher and the student.

Sophisticated technology has helped to resolve these issues to a certain extent. Institutes in India, including the IITs, attempted to incorporate interactive communication into their distance education programmes. However, even when live classes were transmitted, live interaction did not take place between the teacher and students.

It was the vision of Dr. F. C. Kohli that made possible a new beginning in live interactive distance education. An arrangement was worked out between the College of Engineering, Pune (COEP) and IIT Bombay in November 2006 when a team of five faculty members from COEP visited IITB to explore the possibility of receiving live lectures from the institute through CDEEP. It was the passion and commitment of all those involved that ultimately led to the fruition of the programme.

Polycom video conferencing equipment was procured and placed at both COEP and IITB. An exclusive 2 mbps connectivity was ensured between COEP and IITB. Several trials were made for ensuring the audio and video quality. Finally, eight courses were taken live from IITB in the spring (Jan-April) semester of 2007. The time table and academic calendar at COEP were adjusted to match those of IITB. Moreover, tests, assignments, quizzes and examination papers of IITB were used by students at COEP.

This was a new beginning. Some students were excited about live IIT classes being available at COEP in an interactive mode, while some others had apprehensions partly because of technological issues or the level of difficulty of question papers. A lot of convincing was required. In the end, students could say, 'We got the taste of IIT education at COEP itself'.

For every course, a faculty member from COEP was identified as a *course associate* who acted as a bridge between students at COEP and faculty at IITB. Students were able to get their queries answered during the class, although this was for short predefined periods of time. Some of the unattended queries were answered through email. Students were exposed to exciting and challenging assignments. This helped not only the students, but also the faculty at COEP in improving their teaching-learning process. During the course of the last three semesters, as many as 19 courses have been availed by COEP. To be a part of the great vision of Dr. F. C. Kohli and IIT Bombay has been an exciting experience for all of us at COEP.

This successful model is now available for a truly interactive mode of distance education. The quality of the live experience is bound to improve as new technologies emerge. High quality engineering education will be available at the doorstep of every institution in the country. It is for us to make best use of this facility.

Anil Sahasrabudhe
Director
College of Engineering, Pune
Email: director@coep.org.in

CDEEP Courses-Autumn 2008

Given below is a **partial list** of courses which are being offered through CDEEP in the Autumn (July-Nov) semester of 2008. For the **complete list**, please go to http://www.cdeep.iitb.ac.in/autumn.html

Course	Course Instructor	Discipline
Management Information System	Prof. Shashikant Kelkar	Computer Science & Engg.
Embedded Systems	Prof. Kavi Arya	Computer Science & Engg.
Network Theory	Prof. H. Narayanan	Electrical Engg.
Communication Networks	Prof. Kameswari Chebrolu	Computer Science & Engg.
Water and Waste Water Engg.	Prof. V. Jothiprakash	Civil Engg.
Casting Design and Simulation	Prof. B. Ravi	Mechanical Engg.
Quantitative Feedback Theory - I	Prof. P. S. V. Natraj	Systems and Control Engg.
Digital Signal Processing and Applications	Prof. V. M. Gadre	Electrical Engg.
Soil Mechanics - I	Prof. Ashish Juneja	Civil Engg.
Soil Dynamics and Machine Foundation	Prof. Dipankar Choudhary	Civil Engg.
Machine Foundations	Prof. Dipankar Choudhary	Civil Engg.
Electric Devices	Prof. Kishore Chatterjee	Electrical Engg.
Digital Control	Prof. Kannan Moudgalya	Chemical Engg.
Digital VLSI Design	Prof. Jayanta Mukherjee	Electrical Engg.
Reading Fiction	Prof. Sudha Shastri	Humanities and Social Sciences
Statistical Signal Analysis	Prof. U. B. Desai	Electrical Engg.
Transport Phenomena for Material Engg.	Prof. N. N. Viswanathan	Metallurgical Engg
Nonlinear Dynamical Systems	Prof. Madhu N. Belur	Electrical Engg.
Discrete Event System Simulation	Prof. J. Venkateswaran	Industrial Engg.
Formal Specification & Verification of Programme	Prof. S. Chakroborty	Computer Science & Engg.
Electromagnetism	Prof. Dipan Ghosh	Physics
Applied Algorithms	Prof. Milind Sohoni	Computer Science & Engg.
Computational Methods in Fluid & Thermal Engg.	Prof. Atul Sharma	Mechanical Engg.

COURSES FOR YOU

Network Theory (EE225)

I will be teaching the course *Network Theory* to second year students of Electrical Engineering in the Autumn semester of 2008. These students have already undergone the equivalent of a first course in electrical circuits in their first year. They would be familiar with the usual methods of analysis such as nodal and loop analysis for the solution of practical circuits.

The essential features of the course are its emphasis on rigour and the systematic use of graph theory for studying electrical networks. Such an approach is necessary if we have to build reliable circuit simulators, which automatically solve large circuits, of the order of tens of thousands of devices. Another theme that runs through the entire course is the use of vector space methods.

The course begins with a formal description of Kirchhoff's current and voltage equations (KCE and KVE) and the complementary orthogonal nature of solution spaces. As a consequence, Tellegen's Theorem (weak form: if vector v satisfies KVE and vector i satisfies KCE then their '*dot product*' is zero) is proved and several applications are discussed. Another result that is equally fundamental to *Network Theory is* Minty's Theorem and this and its applications are also discussed. The notion of multiports is brought out as a topological notion that does not depend on the type of devices in the network. All the common methods of analysis including nodal, loop, modified nodal and hybrid analysis are developed formally.

Properties of linear circuits made up of resistors, linear controlled sources, capacitors and inductors are studied through the use of state equations as well as through transform methods. Muliport matrices for linear networks are described in the s-domain. Standard methods of dealing with nonlinear networks such as the Newton Raphson technique and small signal analysis are developed. A broad overview of how general purpose circuit simulators are built is also given.

Moreover, an attempt is made to bring out the power of the various ideas in *Network Theory* in order to solve problems in other areas such as optimization.

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Digital Signal Processing and its Applications (EE603)

The advent of modern computers has led to a dramatic increase in computational power and resources. This has enormous implications for signal processing which is the science by which we extract information from signals and modify them. The current scenario has led to the development of certain signal processing tools which were unheard of when processing was purely analog. Further, such tools are easily amenable to modification and upgradation.

However, it has been necessary to adopt one fundamental change in the *modus operandi* of processing signals. Analog processing inherently works with a continuum of values for the independent variable. For the best possible use of computational resources available today, the independent variable must be discretized. If the independent variable is time, for example, one needs to deal with a series of data indexed by discrete points in time.

Over the last quarter of the twentieth century, this subject of dealing with discrete data has evolved tremendously. It is formally termed *Digital Signal Processing* (DSP). Its areas of application include, but are not limited to, data communication, audio and video compression, instrumentation, active noise control, geophysical system analysis and design, biomedical signal and system analysis and wireless communication systems. In fact, the domain of application of DSP is growing every day.

This postgraduate course will be offered through CDEEP during the autumn semester of 2008. The main objectives of the course are:

- To understand the requirements for and implications of working with a discretized independent variable; sampling theorems; correlating the analog and discrete domain.
- To build up the elements of discrete system theory.
- To learn to specify requirements for discrete time systems and to design them.
- To translate these systems into realizations in hardware and software.
- To explore practical applications of DSP.
- To gain awareness in advanced DSP concepts and current developments.

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USEFUL LINKS

IIT Bombay 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
Web address of Reach out	: http://www.cdeep.iitb.ac.in/Reachout
All Courses of IIT Bombay	: http://www.iitb.ac.in/academic-public/Course.html
Live Webcast courses	: http://www.cdeep.iitb.ac.in/solo
Live Edusat Courses	: http://www.cdeep.iitb.ac.in/live

BOOKSHELF

Fundamentals of Approximation Theory

- H N Mhaskar & D V Pai
Narosa Publishing House, 2000
541 pages
ISBN 81-7319-292-8

This book on the basic principles of approximation theory contains classical material about approximation of functions on compact subsets of as well as advanced topics in more abstract areas like best approximation in normed linear spaces. Thus, parts of the book are suited for the beginner, other parts for the advanced researcher.

Chapter I contains the classical density theorems (Weierstras, Bernstein, Korovkin, Stone-Weierstras). Chapter II treats linear Chebyshev approximation (existence, uniqueness, strong uniqueness, discrete approximation, Remez algorithm), while Chapter III contains results about the degree of approximation (direct and inverse theorems). Chapter IV deals with interpolation (Lagrange, Hermite and Hermite-Birkhoff). Chapter V gives a short introduction to connvergence, summability and convergence in L^p mean of the Fourier series. Chapter VI is a long and thorough chapter of the various types of spline functions including B-splines and smoothing splines, and their extremal properties. Optimal quadrature rules and optimal interpolation follow.

Chapter VII gives a short introduction to orthogonal polynomials and their properties. Noteworthy is the Erdős class in which the measure da has support in [-1,1] and $a'(x) > 0$ for almost all $x \in [-1,1]$. Finally, Chapter VIII is the longest and most abstract one. It deals with best approximation in general normed linear spaces. Concepts and results from functional analysis are now widely used. Convexity, solarity and Chebyshevity of sets are one topic. The last section of this chapter deals with optimal recovery.

The book is carefully written, proofs are usually carried out in detail, and mistakes are rare. At the beginning of each section a few lines of motivation are given, and at the end of each chapter there are useful biographical notes and nice and plentiful exercises. The bibliography contains over 300 items. The reviewer has only one desideratum: A list of the many symbols that appear in the text would be welcome.This is a rich book and a valuable addition to the literature in a fast growing field.

Dieter Gaier
Zentralblatt für Mathematik

Q & A

1. In what ways can I take a course through CDEEP?
Our courses can be taken in many ways. By registering at a Remote Centre, you can avail our Edusat courses. You can receive our Webcast courses on your personal computer. You may also buy our courseware on CDs/DVDs. For any queries, send us a mail at cdeep@iitb.ac.in

2. When can I register for a course?
You can register anytime before July 23, 2008, which is the beginning of the next semester.

PROFILE

Prof. Suhas P. Sukhatme

Prof. Suhas P. Sukhatme obtained his Bachelor's degree in mechanical engineering from the Banaras Hindu University (BHU) in 1958. Subsequently, he obtained the degrees of Master of Science and Doctor of Science from M.I.T. in the U.S.A. He joined the Dept. of Mechanical Engineering, IIT Bombay in 1965 and was the Head of the Department from 1973 to 1975. Prof. Sukhatme served as Deputy Director (1983-85) and Director (1995-2000) of IIT Bombay and was also the Chairman of the Atomic Energy Regulatory Board (2000-05).

Prof. Sukhatme has made outstanding contributions, both in teaching and research, in the areas of heat transfer and energy. His main contributions are on (i) heat transfer during condensation of liquid metal vapours, (ii) convective heat transfer in external flows, (iii) heat transfer in thermal insulation, (iv) heat transfer from fin arrays, (v) thermodynamic and transport properties of various fluids and their mixtures, and (vi) heat transfer during condensation of refrigerants on integral-fin tubes. He has guided nineteen students for their Ph.D. degree, published nearly 70 papers and is also the author of two widely known text books in heat transfer and solar energy.

Prof. Sukhatme received the Prince of Wales Gold Medal for standing first in BHU. He was awarded the Shanti Swarup Bhatnagar Prize for Science and Technology in 1983 and was elected as Fellow, of the Indian Academy of Sciences in 1986, of the Indian National Academy of Engineering in 1987, of the Indian National Science Academy in 1995 and of the National Academy of Sciences in 1999. He was awarded the Padma Shri in 2001 and was the first recipient of the Lifetime Achievement Award of IITB. He also received the Om Prakash Bhasin Foundation Award for Engineering and was conferred the title of Doctor of Science (*honoris causa*) by BHU in 2001.

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