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Centre for Distance Engineering Education Programme



A NEWSLETTER OF CDEEP, IIT BOMBAY

<http://www.cdeep.iitb.ac.in>



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Partial List of IITB Remote Centres

- MG Mission's College of Eng. & Tech., Nanded
- Center for Development of Adv. Computing, Kharghar
- Shri G.S. Institute of Tech. and Science, Indore
- Sinhgad Technical Education Society, Pune
- Visvesvaraya National Institute of Tech., Nagpur
- Virtual Institute of Training, Goa
- Persistent Systems Pvt. Ltd., Pune
- Mooljee Jaitha College, Jalgaon
- Nirma Institute of Tech., Ahmedabad
- Veermata Jijabai Tech. Institute, Mumbai
- Osmania University, College of Engg., Hyderabad
- G.H. Rasoni College of Engg., Nagpur
- College of Engg. Pune, Zulai Bhilajirao Patil College, Dhule
- Govt. College of Engg., Amaravati

For in-house employees only:

- Tech Mahindra Ltd.
- Wipro Ltd.

Receiving IIT Bombay's Courses through CDEEP

The widespread dissemination of knowledge is the most important objective of distance education of IIT Bombay. At present, CDEEP transmits regular courses of IIT Bombay through the Edusat satellite as well as through webcasting. Given below is the model to be followed by colleges in order to receive these courses.

IIT Bombay provides a list of courses that are taught every semester along with the course content. Colleges wanting to join CDEEP programmes should go through this list (<http://www.iitb.ac.in/academic-public/Course.html>) and identify courses suitable for them. All courses transmitted by CDEEP are approved by the Senate of IIT Bombay and are regular courses taken by its own students.

Colleges then convey their requirements to CDEEP. In turn, CDEEP gets in touch with faculty members and ascertains if they are willing to make available their courses under the distance education mode.

A timetable for transmission of these courses is then decided. Since the convenience of every participant cannot be met, timings suitable for IITB faculty in consultation with the recipient colleges are fixed. This is conveyed to the colleges well in advance so that they can adjust all their other course timings suitably.

As of now, all courses transmitted by IIT Bombay through both Edusat and webcast are available live in *free* and *value-added modes*. As a result, a college can receive all these courses completely free. Colleges should go for the *free* mode when the lectures are to be used by them only as an additional source of education. The *free* mode is also recommended when only a part of the course is of interest to the college.

When there is a good match between a course transmitted by CDEEP and the one required at the college, the *value-added mode* is strongly recommended. Taking courses in the value-added mode gives participants many

distinct advantages. They can access the Learning Management System (LMS) of IITB (Moodle) which is a web-based group learning tool. The IITB instructor posts all instructional material regarding the course on Moodle. Moreover, assignments, projects, exam papers and their solutions are also posted. Moodle serves also as a discussion forum for students. The instructor can create different threads of discussion on the various doubts faced by students and everyone can participate through this web-based discussion board. Moreover, IITB also provides its question papers and corresponding solutions if colleges wish to synchronise their exams with those at IITB. Thus, the students at IITB and at remote centres have similar access to all material associated with the course.

Video on Demand (VOD) is yet another advantage of the value-added mode. All the lectures in a course are uploaded on the CDEEP website and can be seen any number of times. This is an invaluable resource for students to revise and access missed lectures.

The college can also certify the participation of their students in the value-added programme of IITB.

For every course taken under the value-added mode, a college should identify a course associate (CA) who helps to conduct the course in an orderly manner. The CA is the facilitator between the IITB instructor and the students and has a very important role to play. (See 'Course Associate' on page 3).

Besides the participating colleges, IITB also benefits from transmitting its courses through distance education. Since the courses are recorded, faculty members take extra effort to see that they are better organized and delivered. All the technologies used in distance education, be it transmission over the satellite/web, LMS or VOD, are all used for IITB's own courses. In view of this, CDEEP takes considerable effort to fine-tune these technologies to ensure that the course delivery is of the highest quality.

PROJECT EKALAVYA

Over the past decade, engineering colleges offering computer science and information technology have mushroomed across the country so as to meet the growing demand for such professionals. Unfortunately, this increase in the number of seats has not been matched by enhanced educational infrastructure and resources. As a result, many students and teachers have no guidance and are left to fend for themselves. Thus, there is a desperate need to improve the quality of technical education across the nation.

One programme trying to bridge the above mentioned gap is *Project ekalavya*. It is an Open Source knowledge initiative launched by the Department of Computer Science, IIT Bombay. The project aims at a free exchange of knowledge and ideas by placing all the relevant material in Open Source.

The project has three programmes:

The *eGuru* programme provides e-mentorship by experienced professionals from industry/academia to students preparing their final year engineering projects in computer science, information technology and electronics. This is all done online. The aim of eGuru is to set up a collaborative platform of communication



between students and mentors, as well as to facilitate the entire life cycle of the final year project-conceptualisation, execution, submission and evaluation. It works towards greater participation of the IT industry in academics, and also to create an awareness of Open Source amongst students. All the developed software goes into Open Source and attractive prizes, in collaboration with Red Hat and IBM, are given to the best projects. In 2006-2007, around 3000 students (1000 groups) joined the programme.

The *eOutreach* programme creates high quality digital content in several formats. These include DVDs, VCDs, HTML, text and power point slides, audio and streaming video. The digital contents cover specialised workshops, courses, lectures and seminars. They are made available in Open Source under the Creative Commons license (by attribution 2.5) for wider dissemination of knowledge. Some recorded workshops and lectures are available for free download on the eOutreach website. (<http://ekalavya.it.iitb.ac.in/eOutreachHome.do>)

The *eContent* programme attempts to tackle the problem of non-availability of useful digital content in local languages, thus denying a large number of Indian students the true benefits of the web and internet.

Prof. D. B. Phatak

Principal Investigator, Project ekalavya

URL: <http://ekalavya.it.iitb.ac.in/>

Email: ekalavya@it.iitb.ac.in

CDEEP'S CEP COURSES

CDEEP is offering the following IIT Bombay courses, as continuing education programmes (CEP), to college teachers and working professionals. These are high quality, intensive courses lasting between one to two weeks. A video recording of these courses, lasting 25-50 hours each, will also be made available to participating institutions.

Civil Engineering

- Soil Mechanics II
- Wavelets
- Geotechnical Earthquake Engineering
- Risk Assessment and Management in Geotechnical Engineering
- Matrix Computations
- Advanced Strength of Materials
- Engineering Mechanics
- Fluid Mechanics
- Soil Mechanics
- Structural Analysis II
- Soil Dynamics and Machine Foundations
- Numerical Methods
- Finite Element Methods
- Earthquake Prevention Measures in House Building Business
- Geomorphology & Remote Sensing
- Environmental Geotechnology

Computer Science & Engineering

- Artificial Intelligence
- Object Oriented Systems
- IT Project Management
- Information Systems
- Software Engineering
- Design and Analysis of Algorithms
- Digital Control

Chemical Engineering

- Introduction to Biochemical Engineering
- Instrumentation and Process Control
- Computational Fluid Dynamics and HT
- Wavelets

- Matrix Computations
- Control System Design
- Advanced Strength of Materials
- Engineering Mechanics
- Fluid Mechanics
- Numerical Methods
- Finite Element Methods
- Digital Control
- Introduction to Chemical Engineering
- Process Modelling and Identification
- Control Theory

Electrical/Electronics/ Telecom/ Instrumentation

- Electrical Machines Analysis and Control
- Power Electronics in Power Systems
- Nano Electronics
- Instrumentation and Process Control
- Signals and Systems
- Adaptive Signal Processing
- Wavelets
- Fibre Optic Communications
- Solid State Microwave Devices
- Analog VLSI Design
- Matrix Computations
- Power Electronics
- Broadband Networks
- Transmission Lines & Electromagnetic Waves
- Information Theory and Coding
- Control System Design
- Digital Communication
- Robotics
- Finite Element Methods

- DSP and Its Applications
- Digital Control
- DSP for Identification and Control
- Process Modelling and Identification
- Solar Photovoltaic Technologies
- Communication System Theory
- Control Theory
- Electronic Design

Mechanical Engineering

- Instrumentation and Process Control
- Signals and Systems
- Computation Fluid Dynamics and HT
- Wavelets
- Matrix Computations
- Control System Design
- Advanced Strength of Materials
- Robotics
- Engineering Mechanics
- Fluid Mechanics
- Numerical Methods
- Finite Element Methods
- Digital Control
- DSP for Identification and Control
- Solar Photovoltaic Technologies
- Control Theory

Science Courses

- Electro Magnetism
- Vector Analysis
- Calculus
- Linear Algebra

EMBEDDED SYSTEMS

My colleague, Krithi Ramamritham, and I teach a postgraduate course at IIT Bombay entitled 'Embedded Systems (software) CS684' covering the science and technology of embedding computers where we don't usually see a computer. Embedded Systems are everywhere— in mobile phones, iPods, washing machines, automobiles, ATMs,... The challenges in building these systems are distinct from those in building conventional systems such as banking software, spreadsheets, word processors, etc.

For instance, these systems are typically 'reactive' - a technical term referring to 'real-time' reactions to stimuli in an environment. Often these systems are 'safety-critical'. Consider pacemakers, reactor control systems and avionics systems, where a failure in meeting a deadline for processing might result in a disaster. Whereas conventional systems like spreadsheet calculations can tolerate delays, real-time systems can't afford to miss deadlines. In addition there are other constraints such as size, power consumption and cost. Our course deals with the challenges of building such systems.

While teaching this course through CDEEP, our biggest challenge has been to provide a lab experience for remote students. With the help of a talented colleague, Sachitanand Malewar, we developed a little robot which gives students just this kind of experience. Assignments on this low-cost 'Firebird' robot (typically Rs.5-15,000) illustrate concepts taught in the course. For instance, our module on Control Systems, taught by Prof. Kannan Moudgalya, uses open source Scilab software to build control systems which are used to control our robot.

'Nex Robotics' (<http://www.nex-robotics.com>) helps us make these robots available online and provides support through workshops, etc. This helps us create a vibrant community building open source software and courseware around the robot that helps us share the fun and challenge of building embedded systems.

We plan to offer this course once again through CDEEP during the autumn semester of 2008. So, register yourself for the *CS684-Embedded Systems (software)* course and together let's make embedded systems take-off in India.

Prof. Kavi Arya

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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 ISRO	: http://www.isro.org
Web address of Project ekalavya	: http://ekalavya.it.iitb.ac.in
Web address of Reach out	: http://www.cdeep.iitb.ac.in/Reachout
Live webcast courses	: http://www.cdeep.iitb.ac.in/solo
Live Edusat Courses	: http://www.cdeep.iitb.ac.in/live

COURSE ASSOCIATE

CDEEP provides distance education to students through two modes: the free and value-added mode. The latter allows a college to substitute an IIT Bombay course for one of its own. The benefits of the value-added mode are already explained in 'Receiving IIT Bombay's Courses through CDEEP' on page 1.

For the smooth running of the value-added courses, the college (which becomes a remote centre of IITB) has to identify a course associate (CA). A CA has the required credentials to teach the course but may not have much experience in doing so. Being the binding factor between CDEEP and its remote centres, the CA's duties can be classified under two broad categories: as an educator and an administrator.

The role of the CA as an educator can further be divided into three areas:

- Pre-course: conduct extra classes to teach background material that the students may not be familiar with.
- During the course: conduct tutorials; if the instructor at IITB is willing to conduct labs at the college, then help in the organization; facilitate communication between students and the instructor at IITB through all means including the Learning Management System (LMS).
- Post-course: conduct examinations and evaluate students using the question paper and answer key provided by instructors of IITB and also do the grading.

As an administrator, a CA needs to enforce attendance as well as other rules that are prevalent in the college, make available the technology, equipment and study materials for the smooth running of the course and also give feedback to CDEEP about any difficulties that were faced during the semester.

The teaching load for a CA should be considered as equivalent to that of teaching a full course at the college, if not more, as the courses at IITB are very demanding. IITB allows the college free use of the study material for the course in future. Therefore, if a CA is sincere, he/she will be in a position to handle the course without any further help from IITB. Hence, the college will not have to take the same course again in the value-added mode. There is also the added advantage of having experienced the benefits of the IIT system.

In short, the CA acts as the coordinator of the course, directs CDEEP regarding the need of the remote centre, is the executor and evaluator of the course and provides feedback on the semester-long classes.

Wireless Networking

—A. Kumar, D. Manjunath and J. Kuri
Morgan Kaufmann, 2008
448 pages
Hardcover ISBN 978-0-123-74254-4

Today, wireless communication has become an integral part of our daily lives through cellular telephony, wireless LANs, etc. Both industry and academia are trying to design efficient solutions to fulfill the growing demands in wireless networks. With wireless technology evolving every day, a book that comprehensively presents up-to-date technological developments in this field is very welcome. *Wireless Networking* by A Kumar, D Manjunath and J Kuri is one such book.

Books written on rapidly changing fields can soon become obsolete. Hence, authors have to exercise extra caution in planning such a book. It is enchanting to see the approach taken by A. Kumar *et al.* In *Wireless Networking*, the authors primarily discuss fundamental questions that have to be addressed while designing a wireless network. The solutions to these basic design problems may change depending on technological developments, but the problems themselves remain relevant. The authors have put in special effort to help motivate these design challenges in a wide variety of wireless networks including cellular networks, wireless LANs and multi-hop wireless networks. A good understanding of these issues lay a solid foundation for students and researchers in this area. Further, the authors provide fundamental results obtained regarding these issues, which in most cases, provide the performance limits of these systems. Subsequently, the authors also discuss current research trends.

The book is mainly theoretical with a focus on mathematical modeling, but the authors stimulate the discussion using practical systems. While a basic course on calculus and probability is required to follow the book, additional mathematical concepts which are used are explained in appendices. The book contains many exercise problems which help strengthen the understanding of underlying concepts.

I have used this book as a text for teaching a graduate course on Mobile Wireless Networks and it has been well received by students. In my opinion, the book is suitable for teaching a postgraduate or Ph.D. course on wireless communications.

Prof. Prasanna Chaporkar
Dept. of Electrical Engineering
IIT Bombay

Q & A

1. When does the next (autumn) semester begin?

The autumn semester begins in July.

2. What courses are offered in the autumn semester?

The courses offered shall be made available on the CDEEP website <http://www.cdeep.iitb.ac.in>

3. How can I register for these courses?

Please send us a mail at cdeep@iitb.ac.in

Prof. Dipan Ghosh



Dr. Dipan Ghosh has been a faculty member of the Physics Department in IIT Bombay since 1974. After getting his post-graduate degree from Utkal University with the university gold medal in 1966, he joined the Tata Institute of Fundamental Research. Here, he obtained his Ph.D. in 1971 and thereafter did post doctoral research at the University of Bristol, U.K. and Northwestern University, U.S.A.

Professor Ghosh is a theoretical physicist with research interests in physics of low dimensional systems, exactly solvable models, Monte Carlo simulations in magnetic systems, quantum computing and cryptography.

During his long tenure in IIT Bombay, he has been the Head of the Department of Physics as well as the Computer Centre; Dean of Student Affairs and also Dean, Resource Mobilization; Chairman of the JEE and GATE examinations and more recently, the Deputy Director of the Institute.

Dr. Ghosh is a member of the National Steering Committee for the International Physics Olympiad and was a delegation leader of the Indian Olympiad team. He is a member of the Academic Councils of Homi Bhabha National Institute and DAE-Mumbai University Centre for Basic Sciences. He has been associated with the establishment of the National Institute of Science Education & Research at Bhubaneswar and is a nominee member on the Board of Governors of SVNIT, Surat. He is currently associated with the establishment of IITB's Extension Centre in Gujarat and is a member of the advisory board of the Gujarat Technological University.

Dr. Ghosh has been a teacher of repute and was awarded IITB's excellence in teaching award in 2000. He has authored a book on Mechanics and Thermodynamics which has been reprinted over twenty times since its publication in 1988. He has also authored a course on Engineering Physics and co-authored a course on Fiber Optic Communication for the NPTEL.

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