

Emerging Learning Paradigms on the Internet: NPTEL and NMEICT from India

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NPTEL is an acronym for 'National Programme on Technology Enhanced Learning'

NMEICT is an acronym for 'National Mission on Education through Information and Communication Technology'

Information is NOT instruction--David Merrill

To the memory of Prof. Paul S. Goodman



**PROFESSOR PAUL S. GOODMAN, Cognitive Psychology,
WORLD-RENOWNED PSYCHOLOGIST, RESEARCHER,
AUTHOR AND FILMMAKER AT CARNEGIE MELLON**

MOOC can draw from / Contribute to:

- Open Educational Resources online
- Technology tools for the asking
- Content development online tailored to curricula
- Teaching pedagogy: Outcome based learning and guided teaching for research (open ended)
- Flipped Classrooms and online strategy
- Online Certification through MOOC
- Innovation in Universities

Open Educational Resources (OERs)

- National Efforts
- International Efforts
- Beyond OERs

Open Educational Resources (OERs)

National Programme on Technology

Enhanced Learning (NPTEL)

Virtual Labs

E-GyanKosh

Design-E-kalpa

UGC-CEC content

.....

Open Educational Resources (OERs)

Many Asian Universities and institutions in Asian countries: Japan, Korea, China, Philippines, Malaysia, Vietnam,... (Open Educational Resources: An Asian Perspective, edited by Gajaraj Dhanarajan and David Porter, Commonwealth of Learning, Vancouver, 2013)

Open Educational Resources (OERs)

Project Gutenberg;

Google Books

OpenCourseWare MIT

British Open University

Stanford On iTunes and Stanford Courses

Open Learning Initiative (Carnegie

Mellon University)

Yale University Online

Harvard University

University of California Berkeley...

For a more comprehensive list on all subjects,
<http://www.openculture.com/freeonlinecourses>

National Programme on Technology Enhanced Learning

Eight partner Institutes (seven IITs and IISc Bangalore)
More than 30 Associate Partner Institutions

Professor Bhaskar Ramamurthi, Director, IIT Madras
Overall National Coordinator

Professor Mangala Sunder, Chemistry Dept.
IIT Madras, National Web courses coordinator

Professor Kushal Sen, Textiles Department,
IIT Delhi, National Video Courses Coordinator

**Professor M. S. Ananth (Former Director, IIT Madras),
Visiting Professor, Dept. of Chemical Engg., IISc
Bangalore (Founder of the NPTEL Project)**

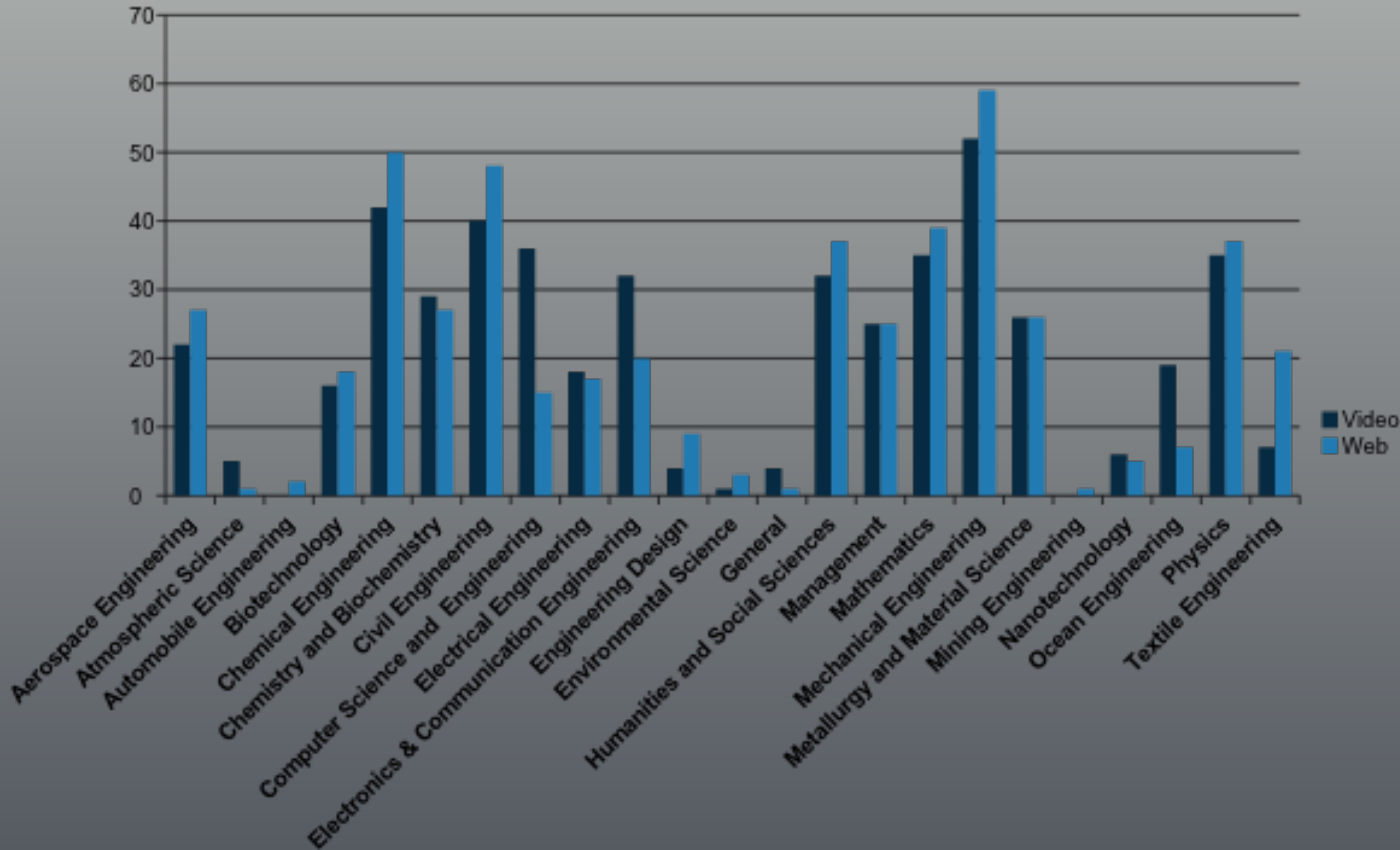
NPTEL

- * A Joint initiative of IITs and IISc (funded in full by MHRD)
- * E-learning through online Web and Video courses in **Engineering, Core Sciences, Technology, Arts, Humanities and Management**

* <http://nptel.ac.in>; <http://www.youtube.com/iit>

100 courses in video format and
100 in web based contents
proposed in 2003 for three years

130 courses in video format and
125 in web based contents released
through 2007 in the NPTEL Website



NPTEL Phases II/III (contents to be developed as 4 quadrants, integrated in the final form)

Content--web based
lecture notes / video
lectures in an
organized form

Animations/
visuals /
illustrations, video
demonstrations/
documentaries and
interactive
simulations
wherever required

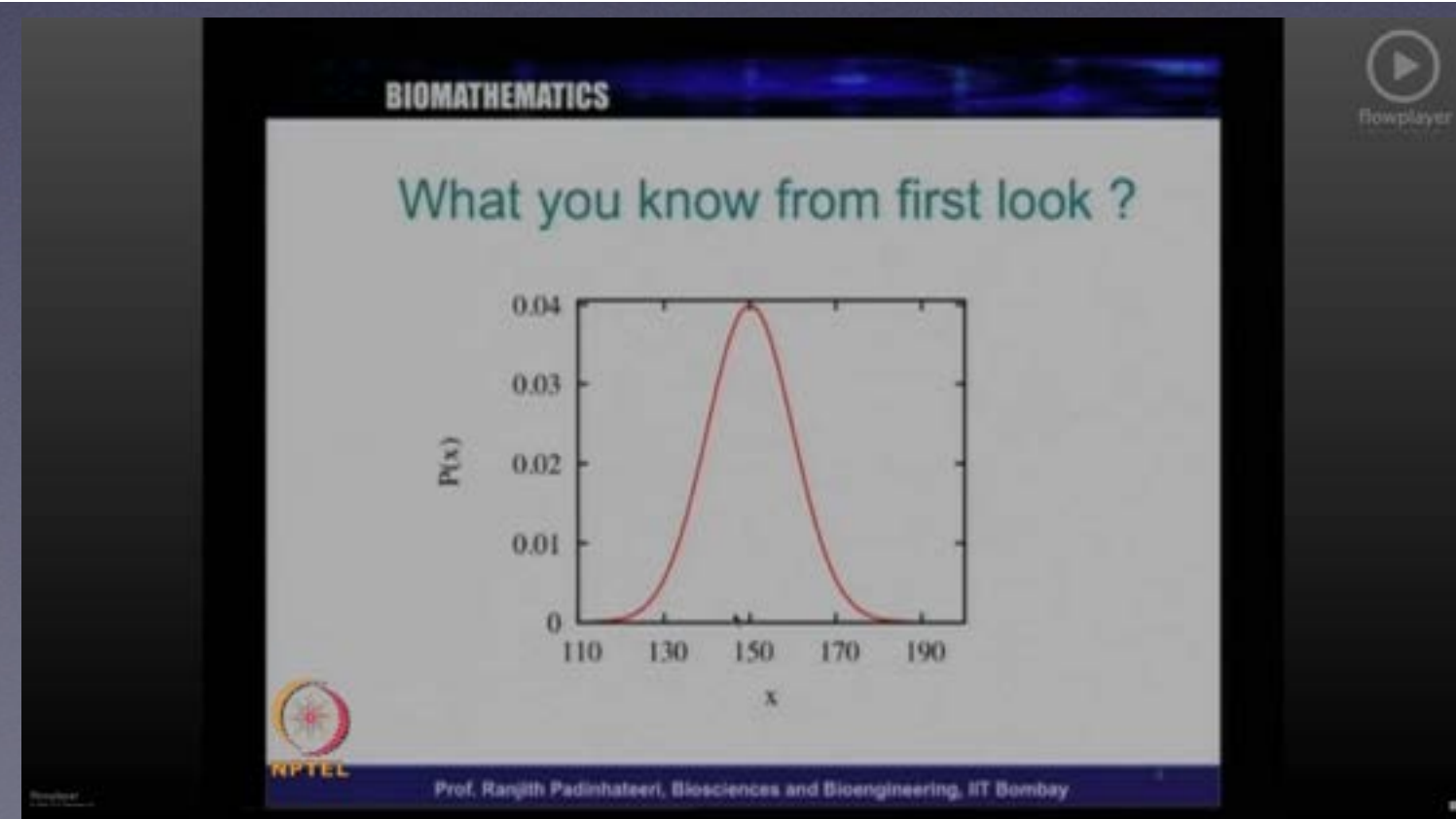
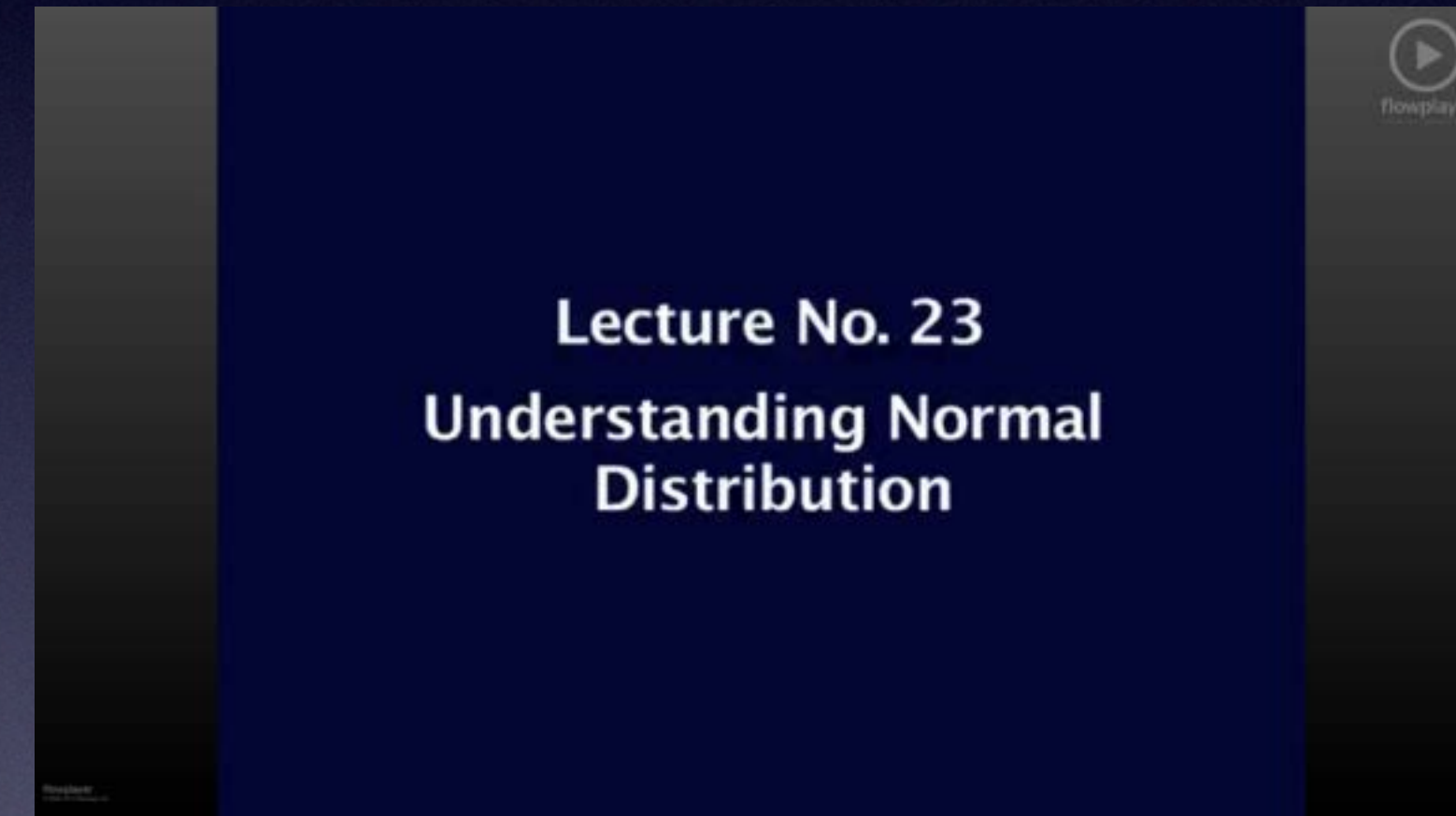
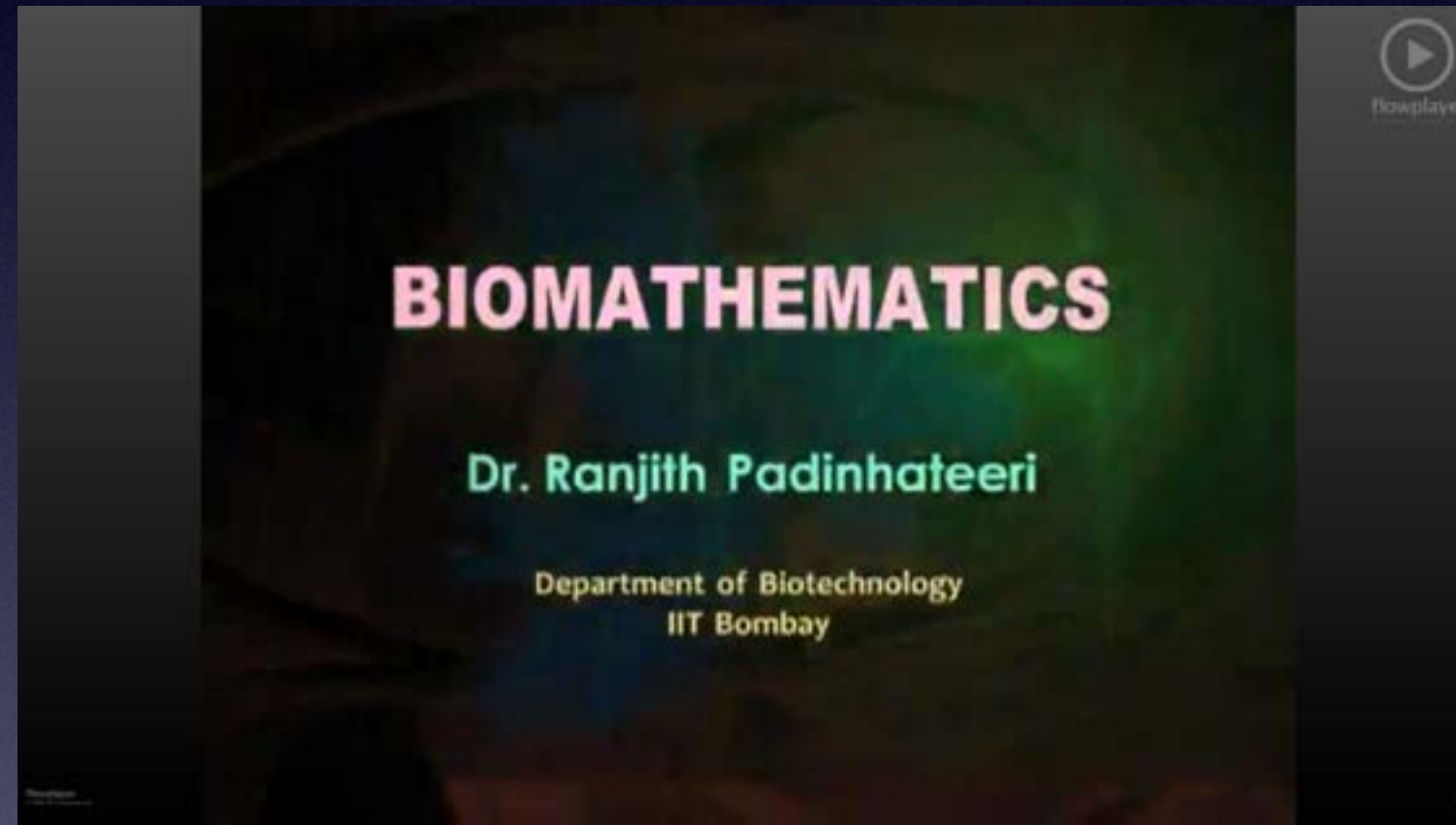
Supplementary reading/Wiki Development on the
course, other resources /open content in the internet,
Case studies, anecdotal information,
historical development of the subject

Problems, quizzes,
assignments and
solutions, online feedback
through discussion forums
and setting up the FAQ

NPTEL

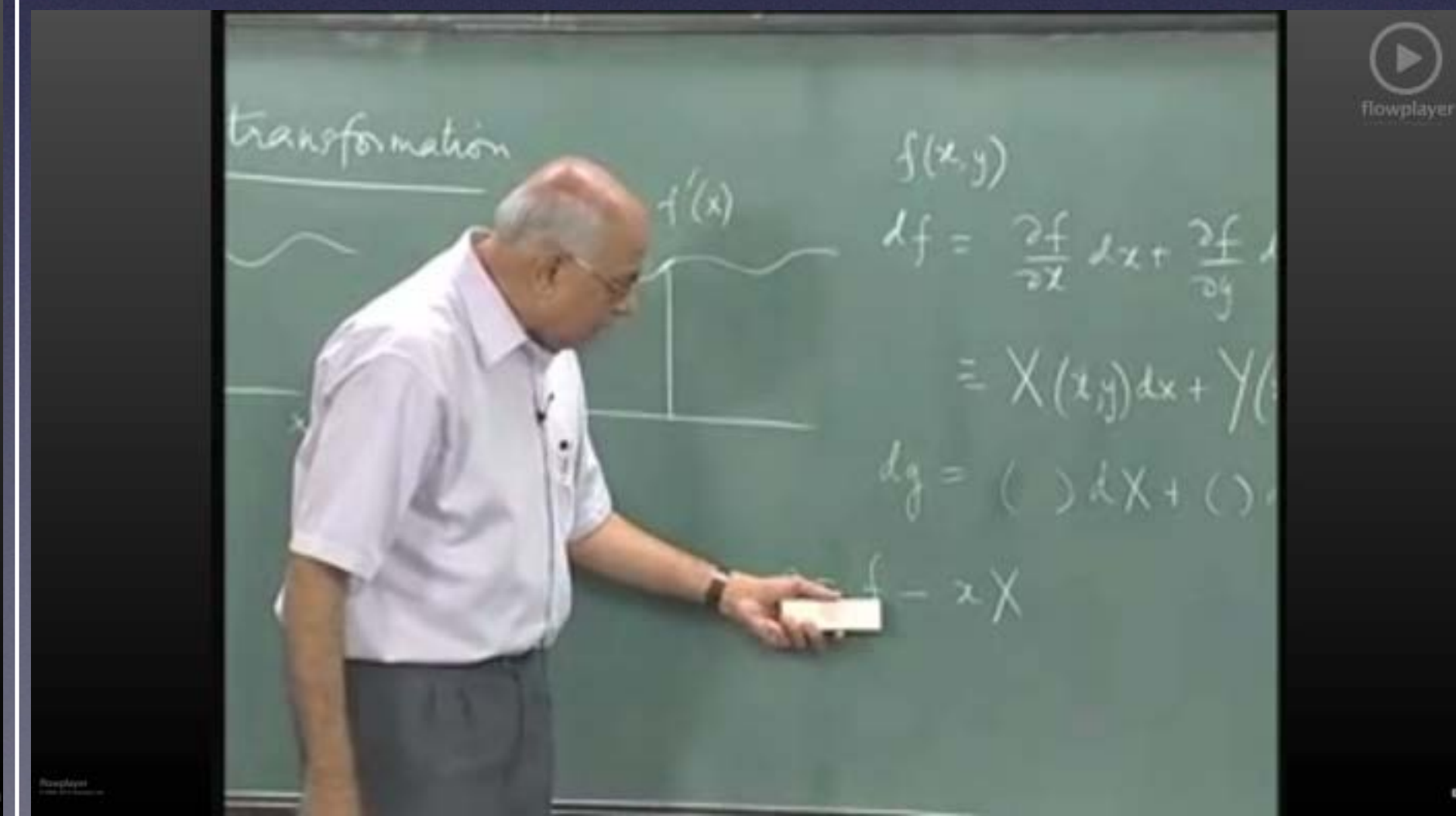
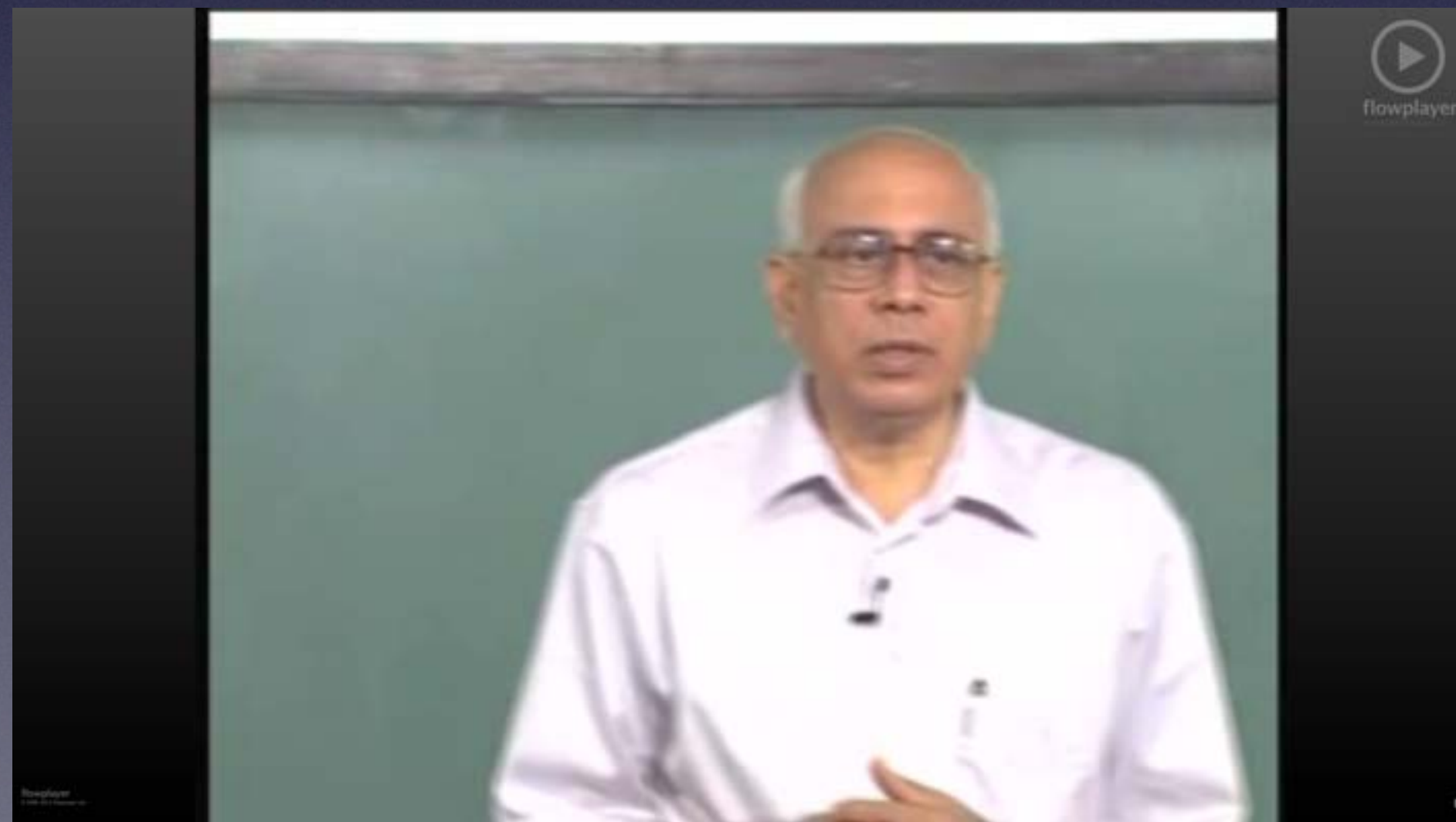
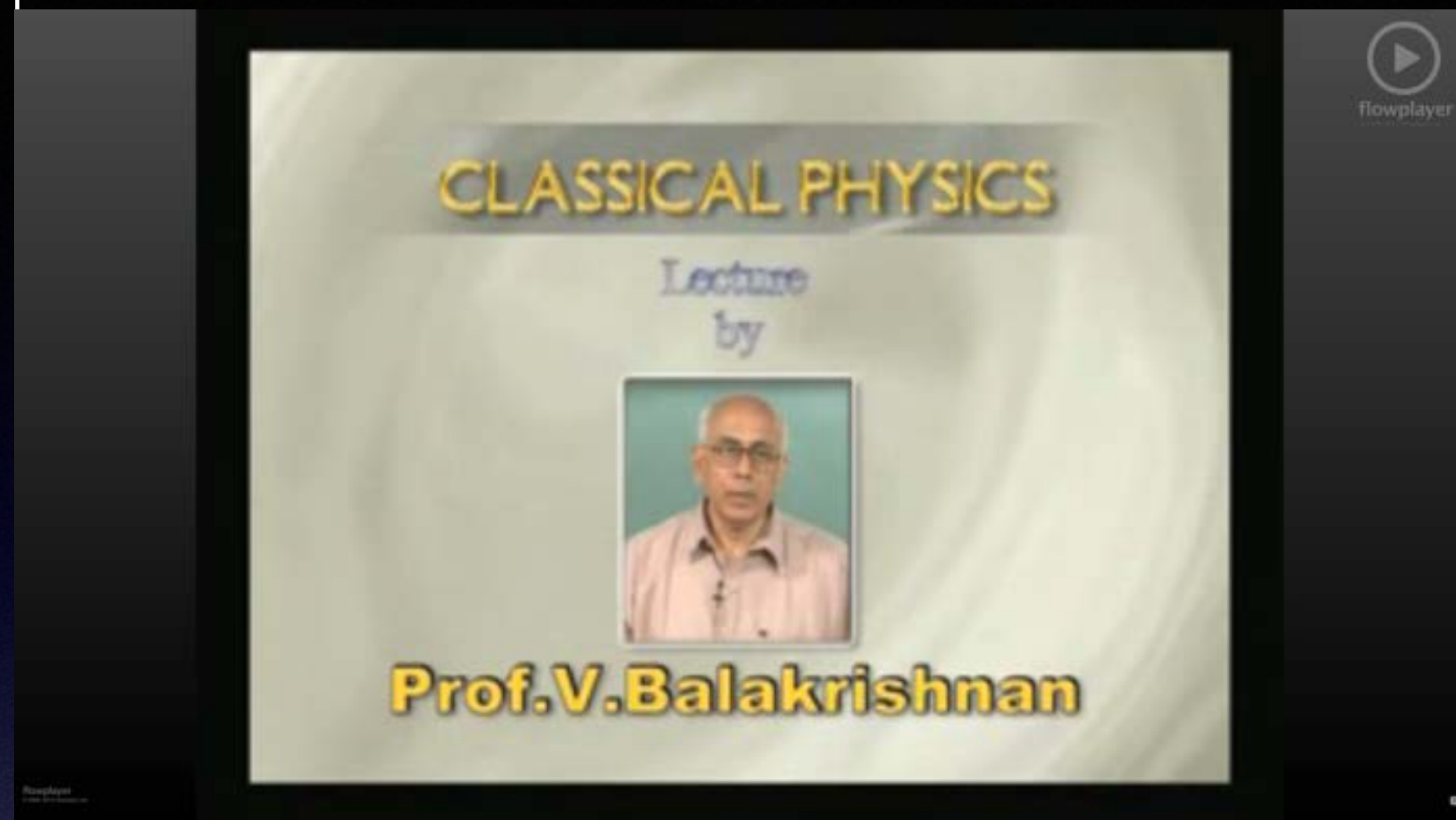
- Each course to provide contents for 40 or more one hour lectures to be used in the classrooms of colleges or for private study
- Curriculum designed using IIT syllabi and those of major affiliating Universities such as Anna University, JNTU Hyderabad and VTU Belgaum and modularized for adoption.

Sample formats (Video)

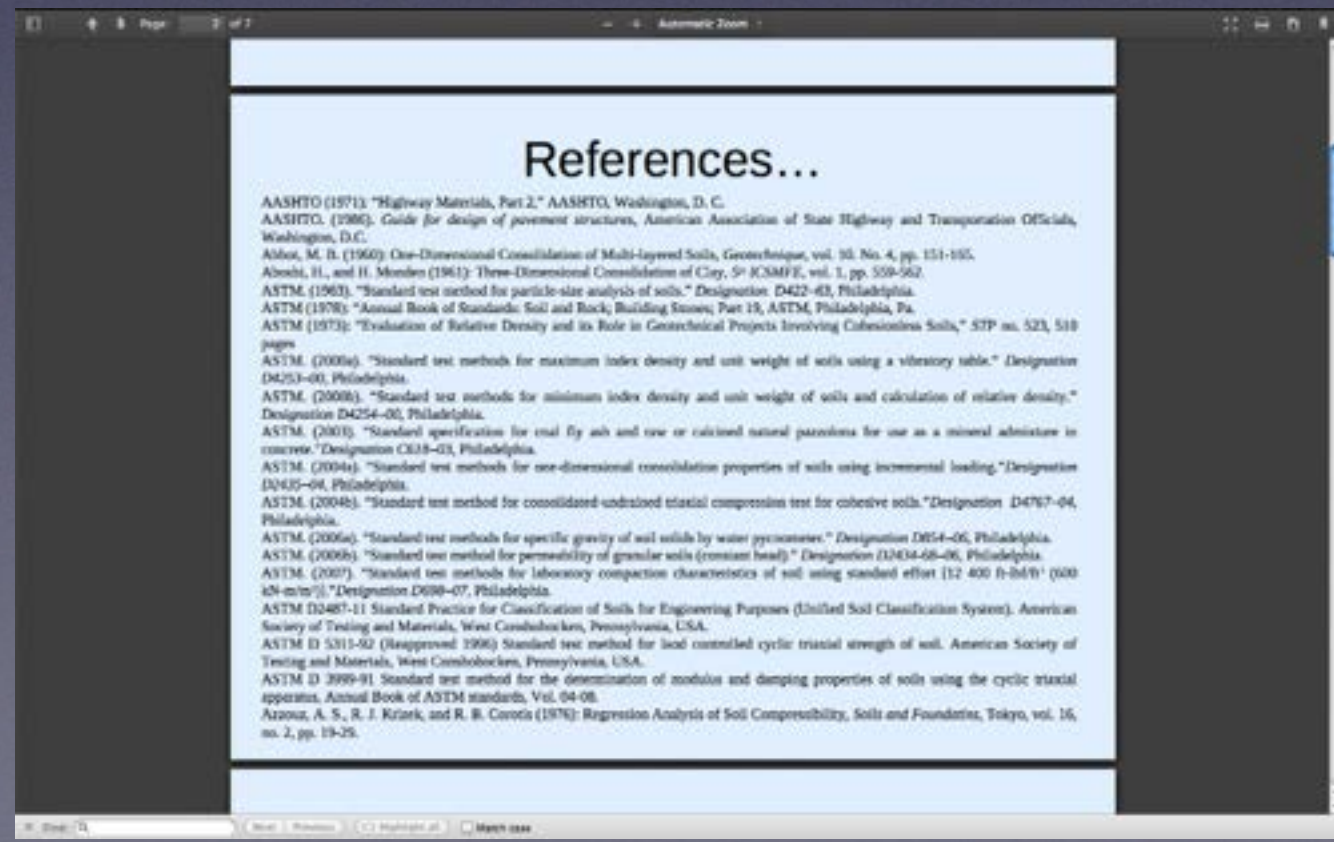
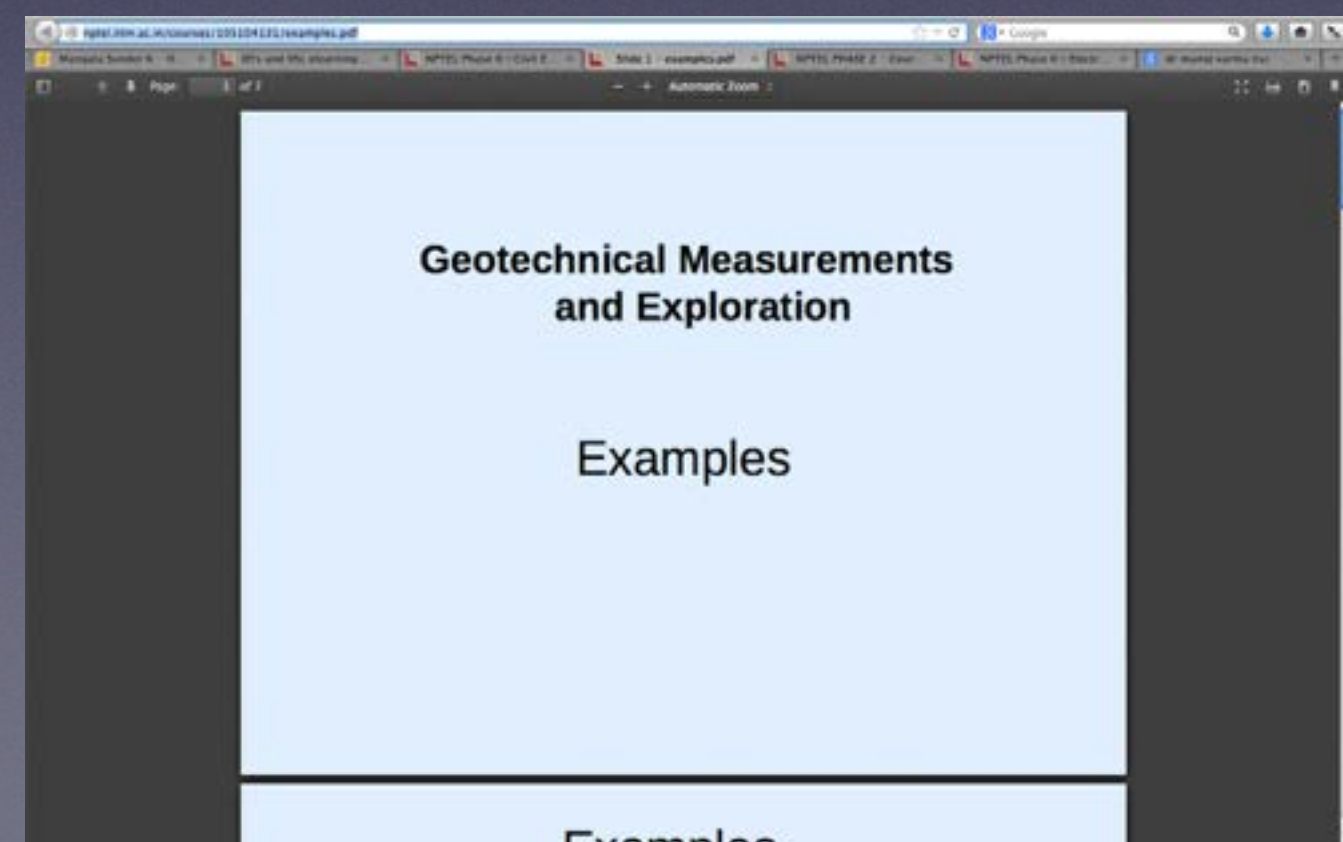
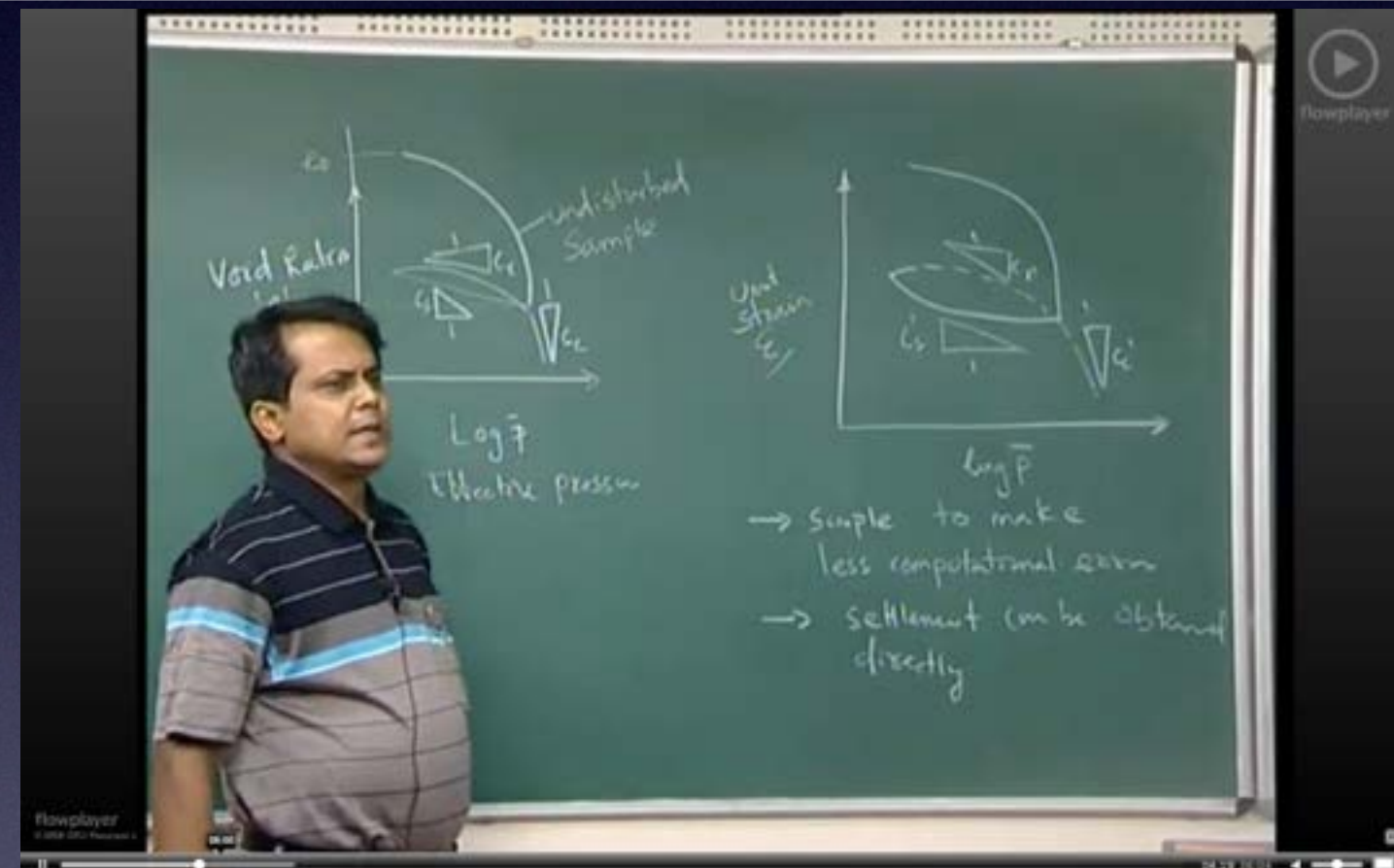
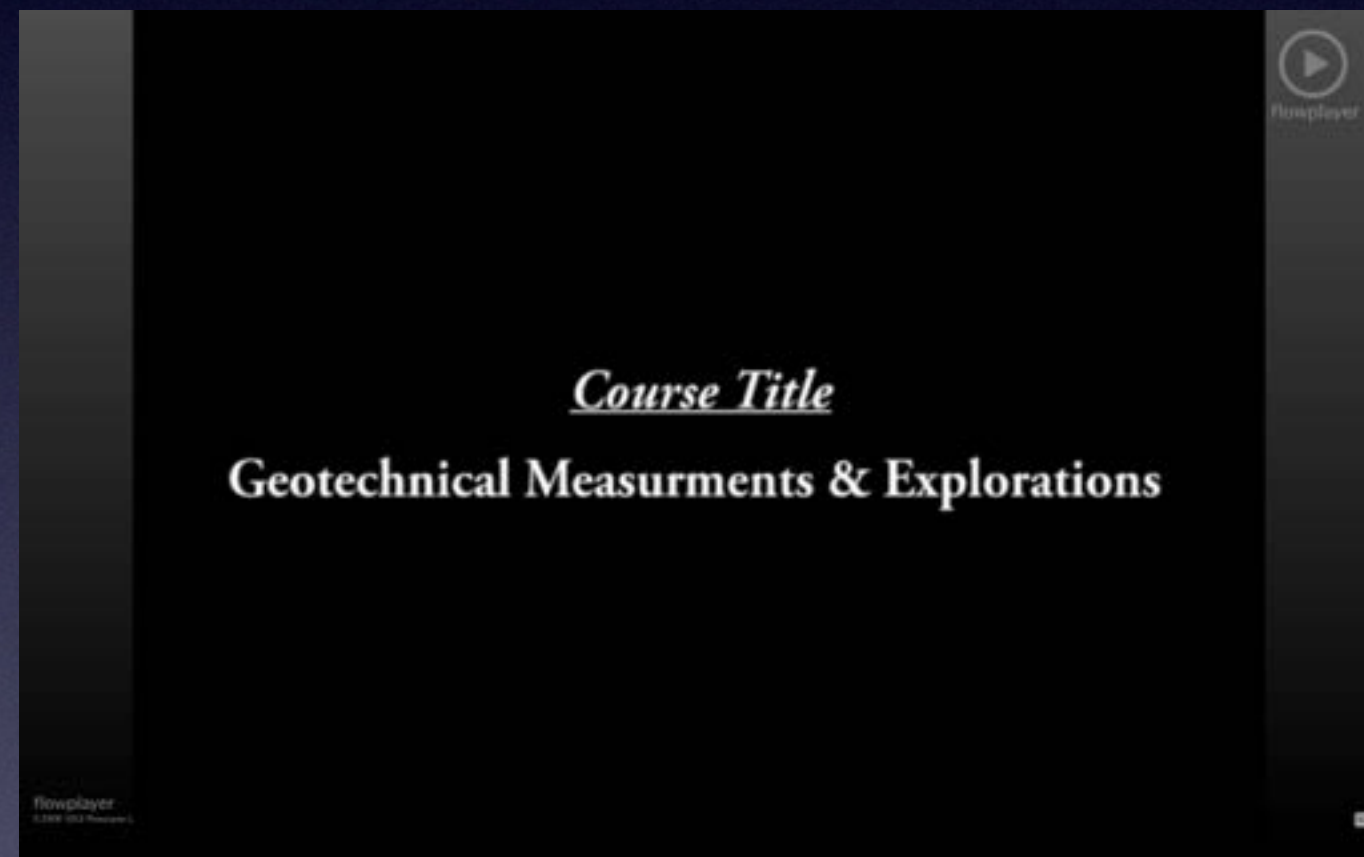


A hand is writing the normal distribution formula on a whiteboard. The formula is
$$P(x) = \sqrt{\frac{b}{\pi}} e^{-bx^2}$$

Sample formats (Video) Contd.



Sample formats (Video)



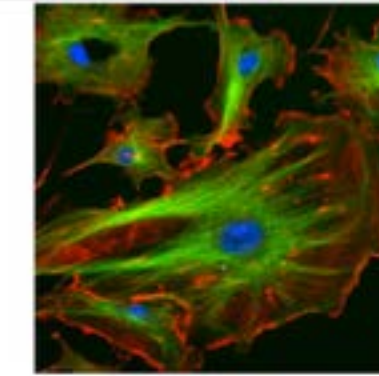
Sample formats (Web)



Biophotonics

Fluorescence Microscopy

- Fluorescence microscopy relies on the process of fluorescence emission which we examined in one of the previous lectures. Briefly, certain molecules when irradiated with light of a certain wavelength called the excitation wavelength are able to excite their electrons to a higher energy state which after some vibrational relaxation moves back to the ground state followed by the emission of a photon with lower energy than the incident photon.



Endothelial cells observed under fluorescence microscope. Nuclei are labeled blue with a fluorophore called DAPI which binds to DNA. Microtubules are labeled green by an antibody bound to a green fluorophore called FITC and actin filaments are labeled red with a fluorophore called TRITC.
Image courtesy Wikipedia Commons

NPTEL Biophotonics

3

Basic Microscope Train

- The simplest image magnifier is a single lens. However to get uniform images free of distortions, one needs a more sophisticated design of the 'image train'.

- Ocular lens (eyepiece) (1)
- Objective turret or Revolver or Revolving nose piece (to hold multiple objective lenses) (2)
- Objective (3)
- Focus wheel to move the stage (4 - coarse adjustment, 5 - fine adjustment)
- Frame (6)
- Light source, a light or a mirror (7)
- Diaphragm and condenser lens (8)
- Stage (9)

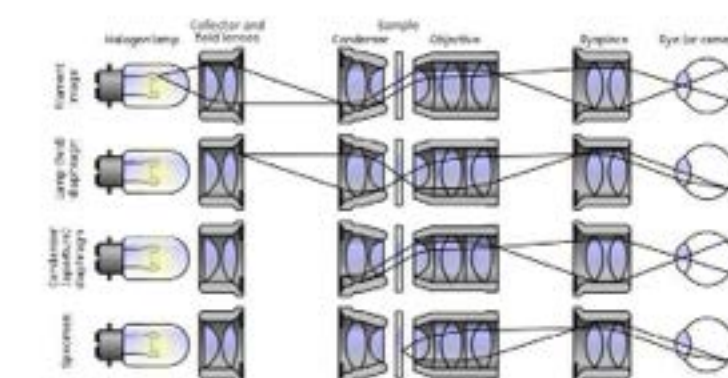


NPTEL Biophotonics Image courtesy: Wikipedia Commons

4

Kohler Illumination

- Kohler illumination ensures uniform illumination across the sample plane. The illumination often comes from a lamp which contains a filament. Direct projection of the illumination onto the sample plane using a collector lens produces an image of the filament on the sample plane which is imaged by the objective lens along with the sample.



NPTEL Biophotonics

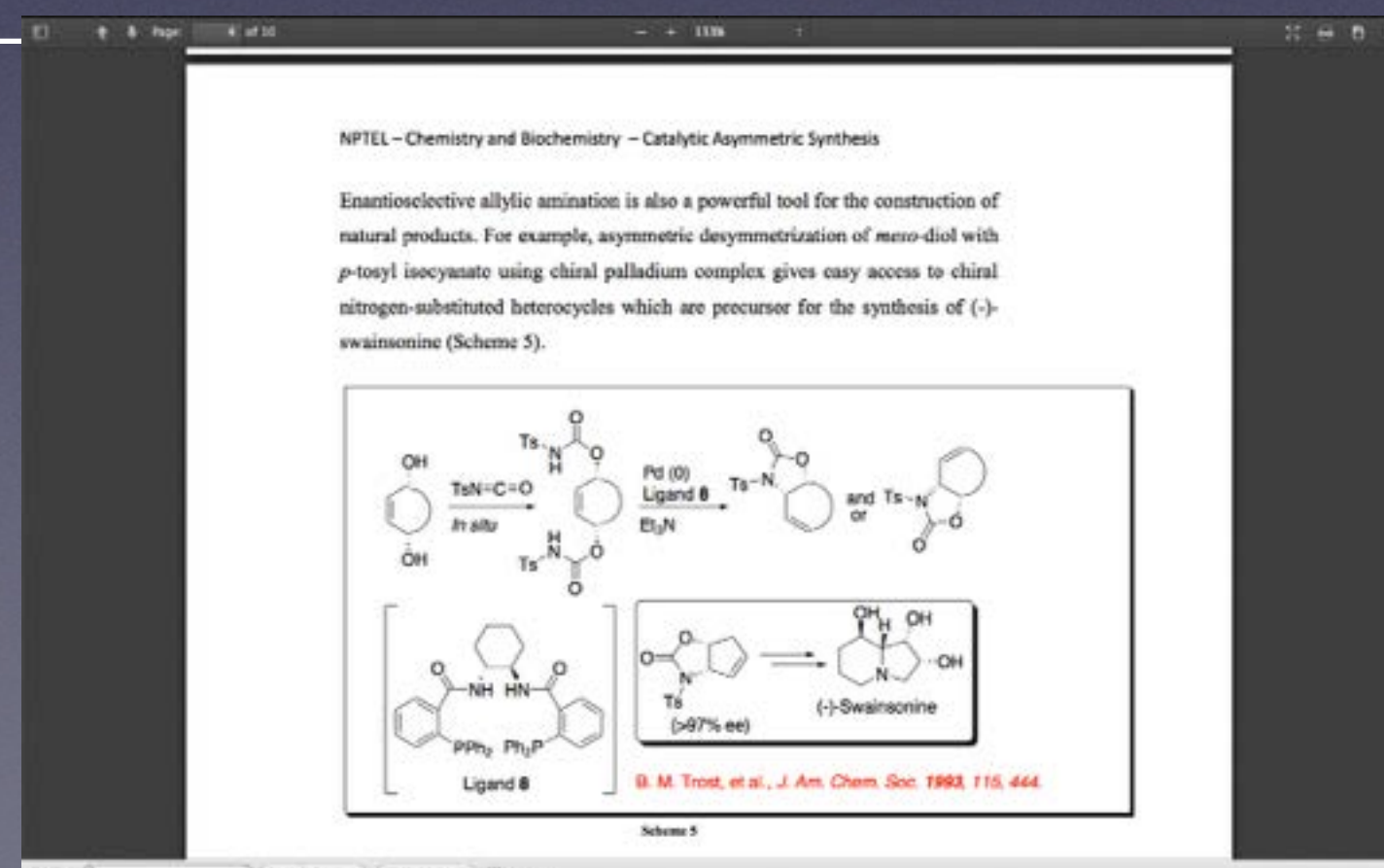
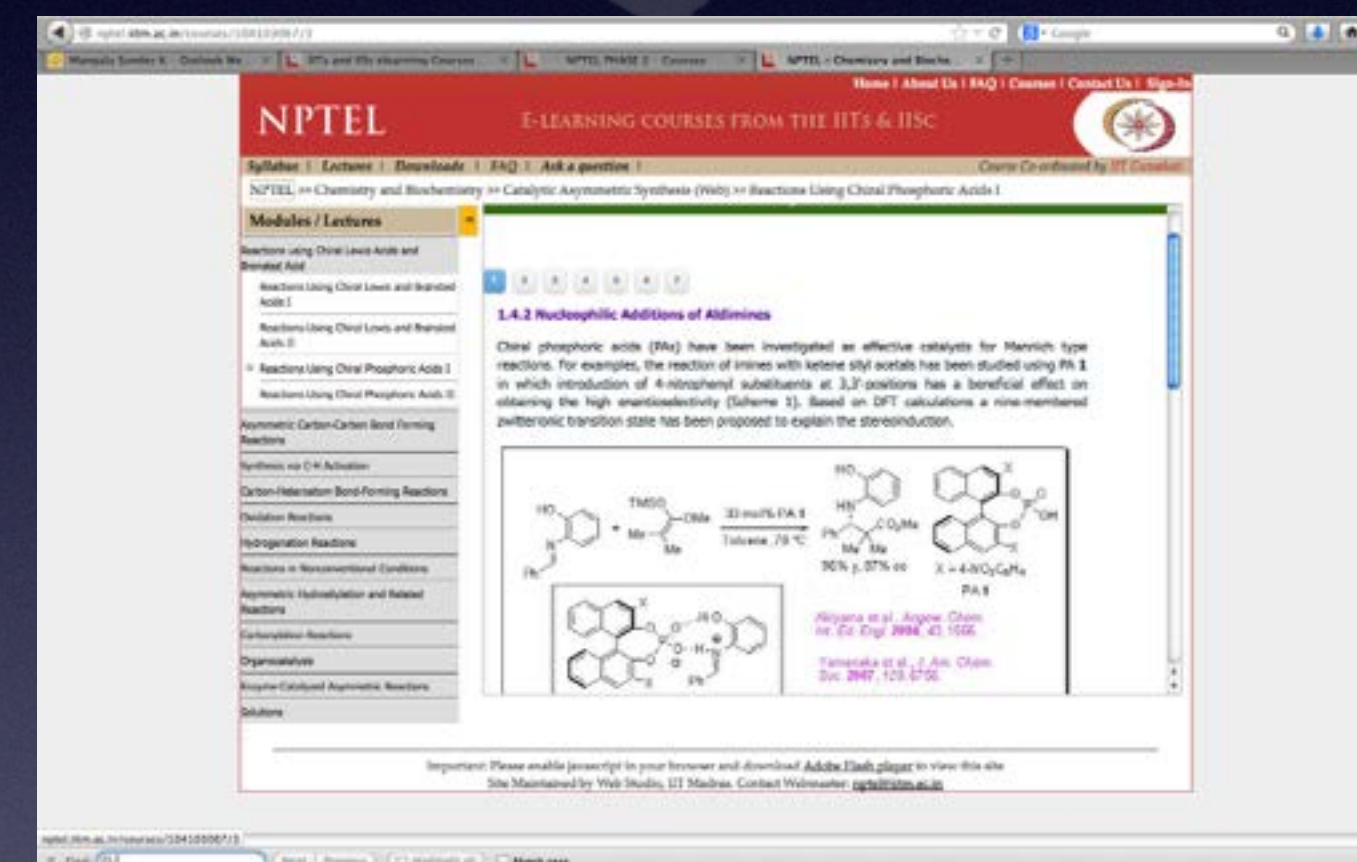
Image courtesy: Wikipedia Commons

5

Sample formats (Web)



Catalytic asymmetric synthesis

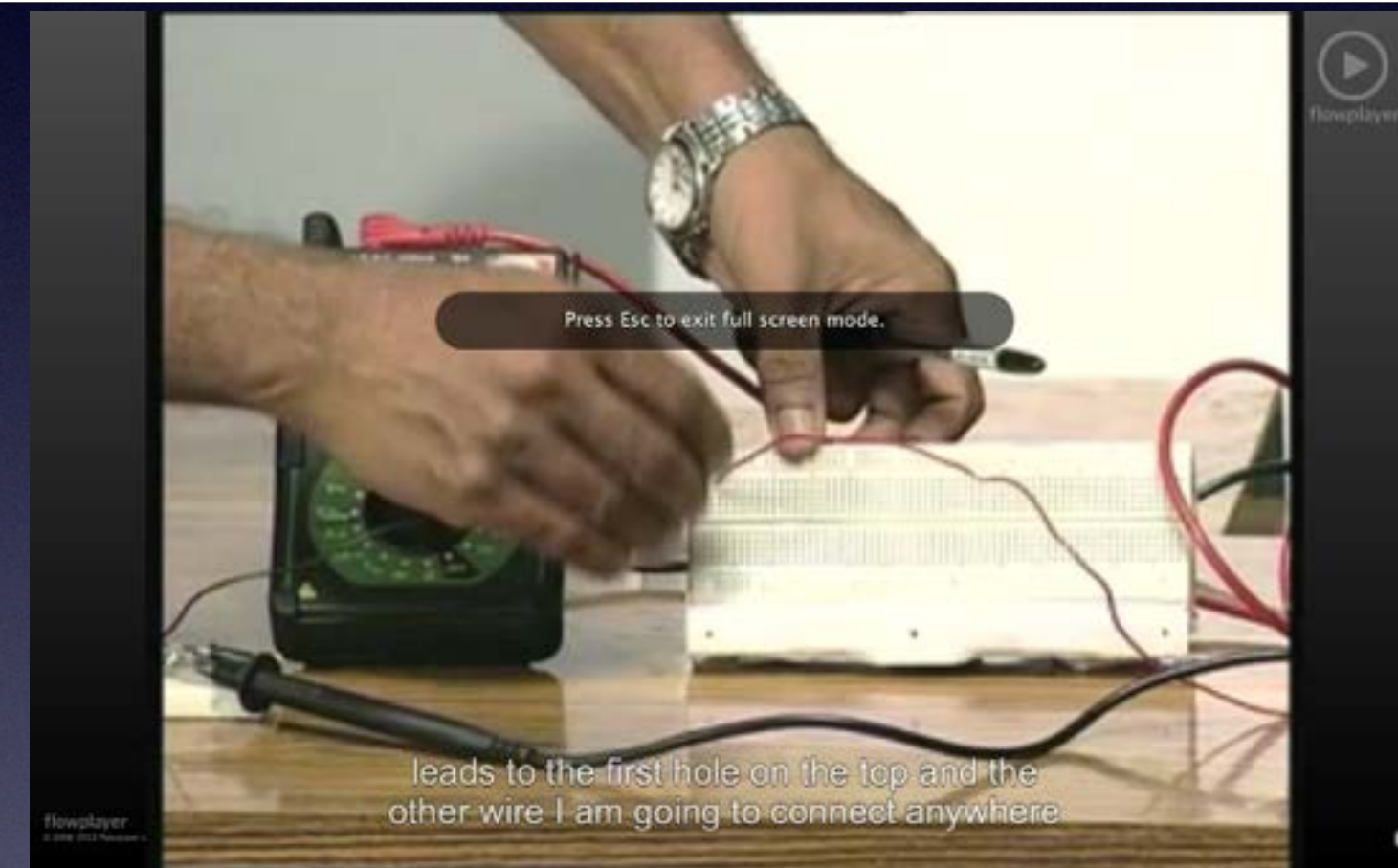


About 800 courses on the NPTEL site already

Sample formats (Web)



Basic electronics Prof. T. S. Natarajan, IIT Madras



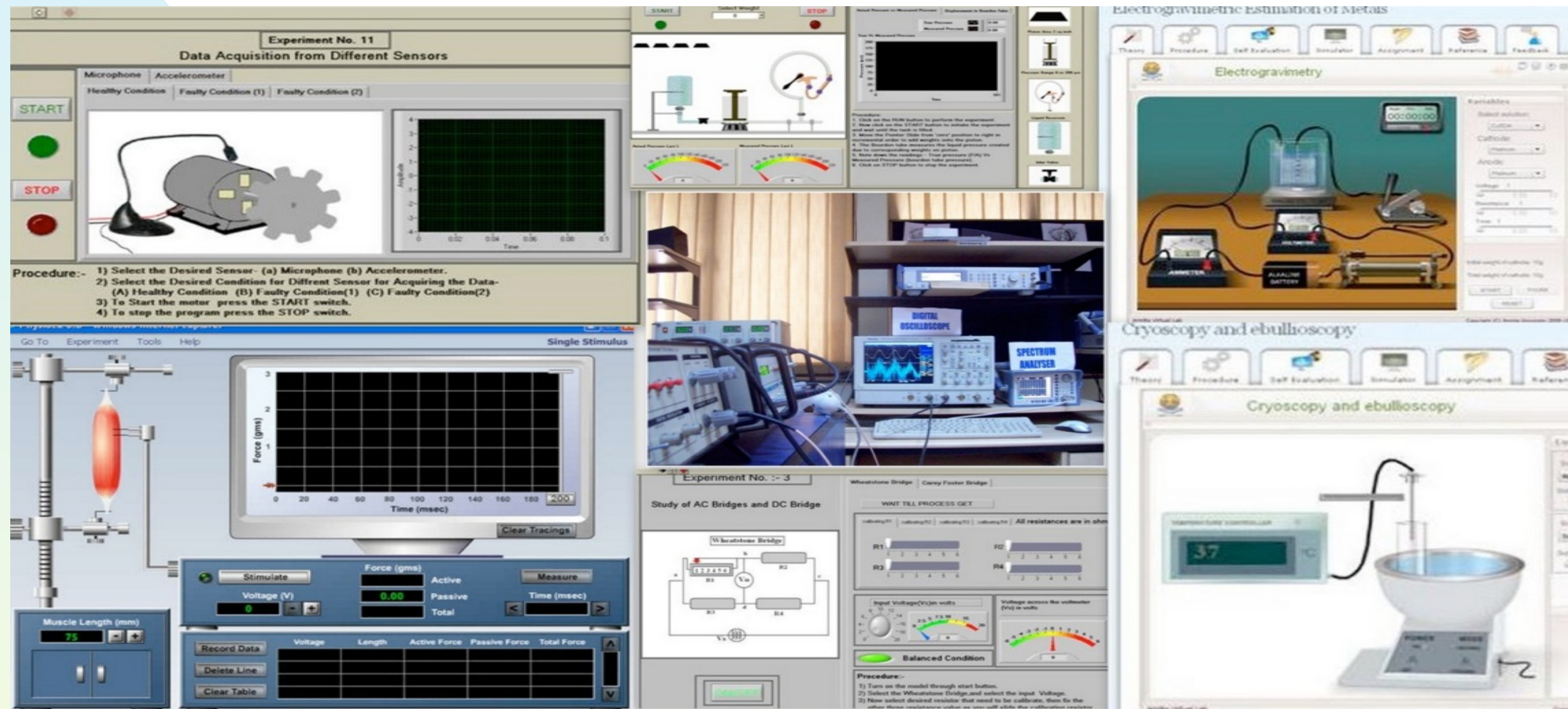
About 800 courses on
the NPTEL site already

NMEICT

<http://www.sakshat.ac.in>



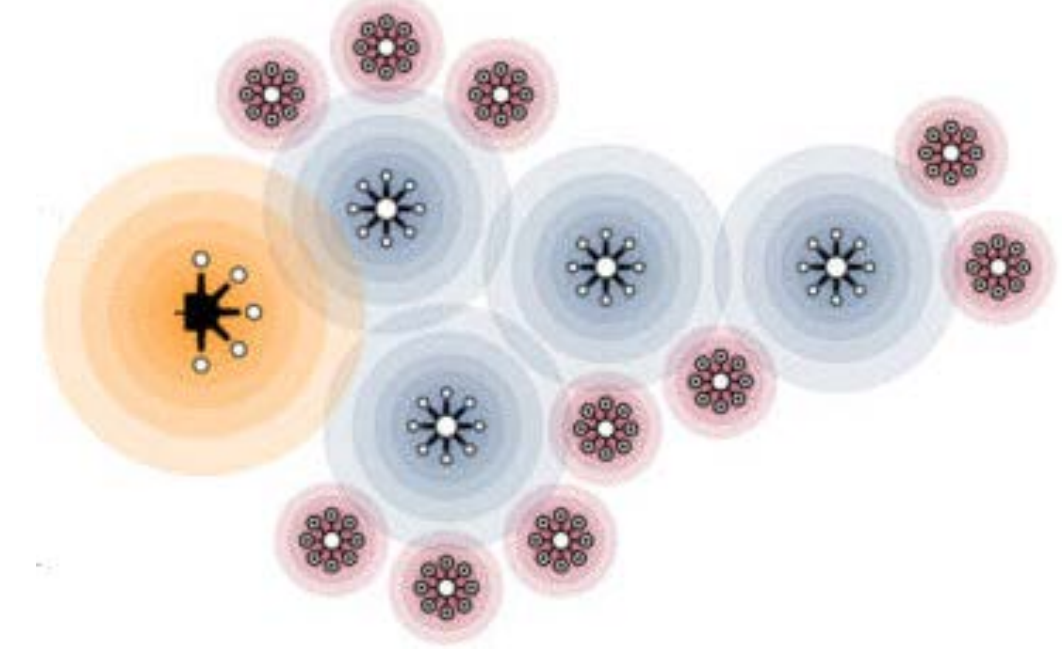
Virtual Labs



**IIT Delhi, IIT Kanpur, IIT Bombay, IIT Madras, IIT Kharagpur, IIT Guwahati,
IIT Roorkee, IIT Hyderabad, Amrita University,
Dayalbagh University, NIT Surathkal, COE Pune**

From the slides provided by Prof. Ranjan Bose, IIT Delhi

Motivation



**Physical Distances
Limit Doing
Experiments**

**Sharing of
Costly
Equipment**



**Proliferation of
Quality Labs**



Objectives of the Virtual Lab Project

- To provide **remote-access to labs** in various disciplines of Science and Engineering.

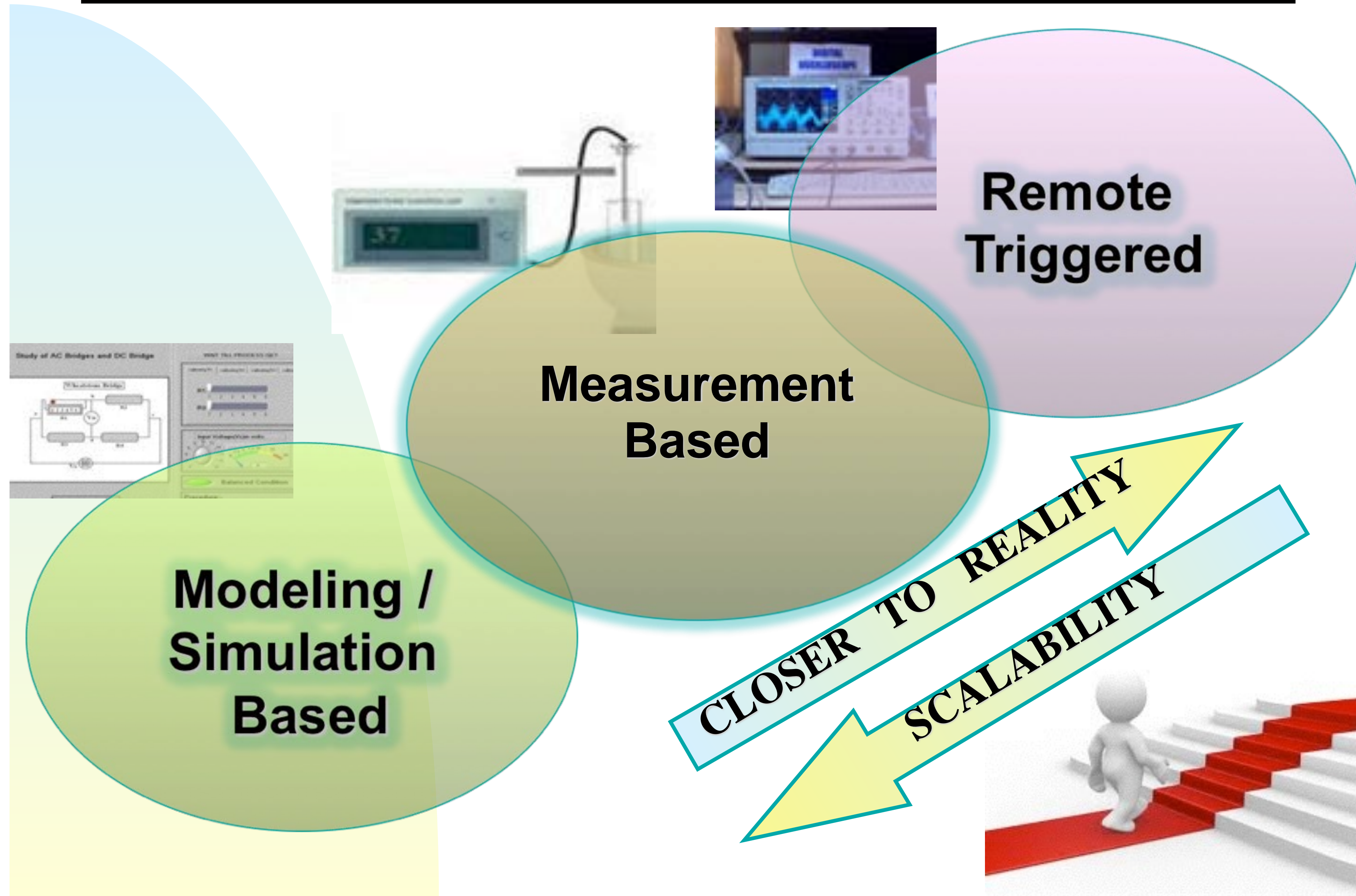


- To cater to **students** at the UG level, PG level as well as to research scholars.

- To enable the students to learn at their **own pace**, and to arouse their **curiosity**.

- To provide a complete **Learning Management System** that includes web-resources, video-lectures, animated demonstrations and self evaluation.

Types of Virtual Labs



Participating Institutes



IIT Delhi



IIT Bombay



IIT Kanpur



IIT Kharagpur



IIT Madras



IIT Roorkee



IIT Guwahati



IIIT Hyderabad



Amrita University



Dayalbagh University



NIT Karnataka

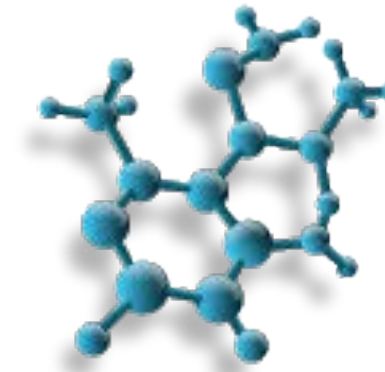


COE Pune



Broad Areas for Virtual Labs

- **Electronics and Communication Engineering**
- **Computer Science and Engineering**
- **Electrical Engineering**
- **Mechanical Engineering**
- **Civil Engineering**
- **Chemical Engineering**
- **Biomedical and Biotechnology Engineering**
- **Chemical Sciences**
- **Physical Sciences**



All areas of Science and Engineering are covered



Website: www.vlab.co.in

The screenshot shows the homepage of the Virtual Labs website. At the top left, there is a logo with 'VL' on a globe and the text 'VIRTUAL LABS'. Below it, it says 'An Initiative of Ministry of Human Resource Development (MHRD) Under the National Mission on Education through ICT'. To the right, there is a search bar with 'Name of Lab' and 'Broad Area' dropdowns, and a 'Search' button. The main banner features a large 'Virtual Labs' title and the same initiative text. Below the banner, there is a section for 'PARTICIPATING INSTITUTES' listing IIT DELHI, IIT BOMBAY, and IIT KANPUR with their logos. To the right of this is a section for 'Objectives of the Virtual Labs:' with two bullet points. Further right is an 'Announcements' section with a 'Welcome to Virtual Labs.' message.

Home

VIRTUAL LABS
An Initiative of Ministry of Human Resource Development (MHRD)
Under the National Mission on Education through ICT

Name of Lab: Broad Area: Search

Virtual Labs

(An initiative of Ministry of Human Resource Development
under the National Mission on Education through ICT)

PARTICIPATING INSTITUTES

-  IIT DELHI
-  IIT BOMBAY
-  IIT KANPUR

Objectives of the Virtual Labs:

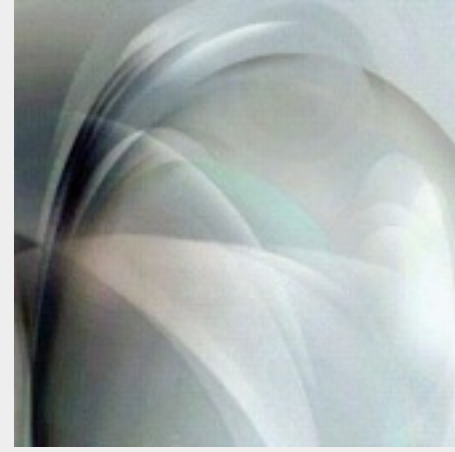
- To provide remote-access to Labs in various disciplines of Science and Engineering. These Virtual Labs would cater to students at the undergraduate level, post graduate level as well as to research scholars.
- To enthuse students to conduct experiments by arousing their curiosity. This would help them in learning basic and advanced concepts through remote experimentation.

Announcements

Welcome to Virtual Labs.

One common website to access all Virtual Labs





Creating Digital-Learning Environment for Design in India - 'e-kalpa':

- ▶ National Mission in Education through ICT



Slides by Prof. Ravi Poovaiah, IIT Bombay



4 Key Themes:

IDC IIT Bombay
 NID Ahmedabad
 DoD IIT Guwahati

'e-kalpa' Focus Areas	Achievements so far:
1. Digital online content for learning Design with distance e-Learning programs on Design	Setting up of the webspace 'Dsource.in' for access to content along with studio with equipment and support staff at each of the partner Institutes
3. Digital Design Resource Database including the craft sector	Documentation of resources in terms of process, methodology, case studios to create content undertaken at the partner Institutes
2. Social networking for Higher Learning with collaborative Learning Space for Design for Synchronous and Asynchronous Interaction	Experimenting with the webspace 'Dsquare.in' for access to content along with studio and support staff at each of the partner Institutes
4. Design inputs for products of National Mission in Education through ICT	Support is being to other initiatives of NMICT - Jellow, Sakshat website + Identity, logo, naming, etc.

1. Digital online content for learning
2. Digital Design Resources
3. Networking for learning
4. NMEICT support



Deliverables:

	Expected Deliverables for the Project	Completed till now Feb 2012
i. Design Courses	40 Courses	40 Courses
ii. Full resource documentation of fine examples of Design, crafts and arts + Workshops with Experts	40 Topics	50 topics
iii. Video Lectures of eminent designers	25 Lectures	25 lectures
iv. Case Studies of good design projects by professions and students	70 Case Studies	70 Case Studies
v. Documentation of design process from around the country each in 12 images x12 words	150 topics	200 topics



1. Digital online content for learning Design:

www.dsourc.in

(enabled for tablets)

Aakash

iPad2

Galaxy



Original Product

Colour and Form-II - The Fundamentals of Colour



Googles for a teenager

DoD IIT Guwahati
IDC IIT Bombay
NID
Sponsored By
NME-ICT



most recent



Design Course on
Character Design for Animation
Character Design for Animation
by
Professor Phani Tetali & Vajra Pancharia
Industrial Design Centre (IDC), IIT Bombay



Design Course on
Design of Signage
Design of Signage
by
Professor Ravi Poovaiah
Industrial Design Centre (IDC), IIT Bombay



Design Course on
Experience Design
Experience Design
by
Prof. Shashank Mehta
NID R&D campus, Bangalore

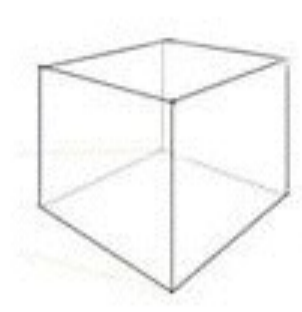


Design Course on
Design Drawing and Representation
Design Drawing and Representation
by
Ms. Jagriti Galphade

most seen



Design Course on
Elements of 3D Design
Towards Design of Objects
by
Prof. Ravi Mokashi Punekar
Department of Design, IIT Guwahati



Design Course on
Product Drawing
Representation of Objects
by
Professor Kadiru Ramachandran
Industrial Design Centre, IIT Bombay



Design Course on
Calligraphy
The design of beautiful hand letterings
by
Prof. R. K. Joshi
Industrial Design Centre, IIT Bombay



Design Course on
Ceramic
The craft of pot making
by
Sakshi Gambhir
Industrial Design Centre (IDC), IIT Bombay



Design Resource

Galleries

12 x 12 or bara by bara
by
Several Contributors
Open Design Resource Bank for
India



Submit Design Case Studies



Channapatna, Toy town -

DoD IIT Guwahati
IDC IIT Bombay
NID

Sponsored By
NME-ICT



Design Resource
Galleries
12 x 12 or bara by bara
by
Several Contributors
Open Design Resource Bank for
India



most recent



Design Resource Galleries
Gangaicondacholapuram
Chola architecture
by
Ms.Sanjukta Das
Industrial Design Centre (IDC), IIT Bombay



Design Resource Galleries
Darasuram Chola architecture
Airavatesvara Temple
by
Ms.Sanjukta Das
Industrial Design Centre (IDC), IIT Bombay



Design Resource Galleries
Summer camp
Making of pin board
by
Ms.Chitra Gohad
Industrial Design Centre (IDC), IIT Bombay



Design Resource Galleries
Red Fort New Delhi
Red Fort New Delhi
by
Ms.Chitra Gohad
Industrial Design Centre (IDC), IIT Bombay



Design Resource Galleries
Making of sculpture
clay carving



most seen

Design Resource Galleries
Classic Logos of India
Classic Logos of India
by
Nanki Nath, Ph. D student and
Prof. Ravi Poovaiah
Industrial Design Centre, IIT Bombay



Design Resource Galleries
Magic Mascots of India
Magic Mascots of India
by
Nanki Nath, Ph. D student and Prof. Ravi
Poovaiah,
Industrial Design Centre, IIT Bombay



Design Resource Galleries
Erstwhile Logos Of India
Erstwhile Logos Of India
by
Nanki Nath, Ph. D student and Prof. Ravi
Poovaiah
Industrial Design Centre, IIT Bombay



Design Resource Galleries
Logos representing India
Logos representing India
by
Nanki Nath, Ph. D student and Prof. Ravi
Poovaiah
Industrial Design Centre, IIT Bombay



Design Resource Galleries
Jali Patterns
Jali Patterns



Design Courses Character Design for Animation

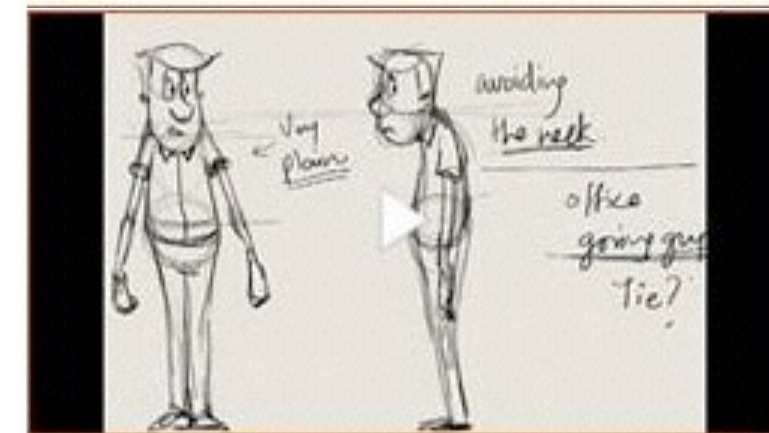
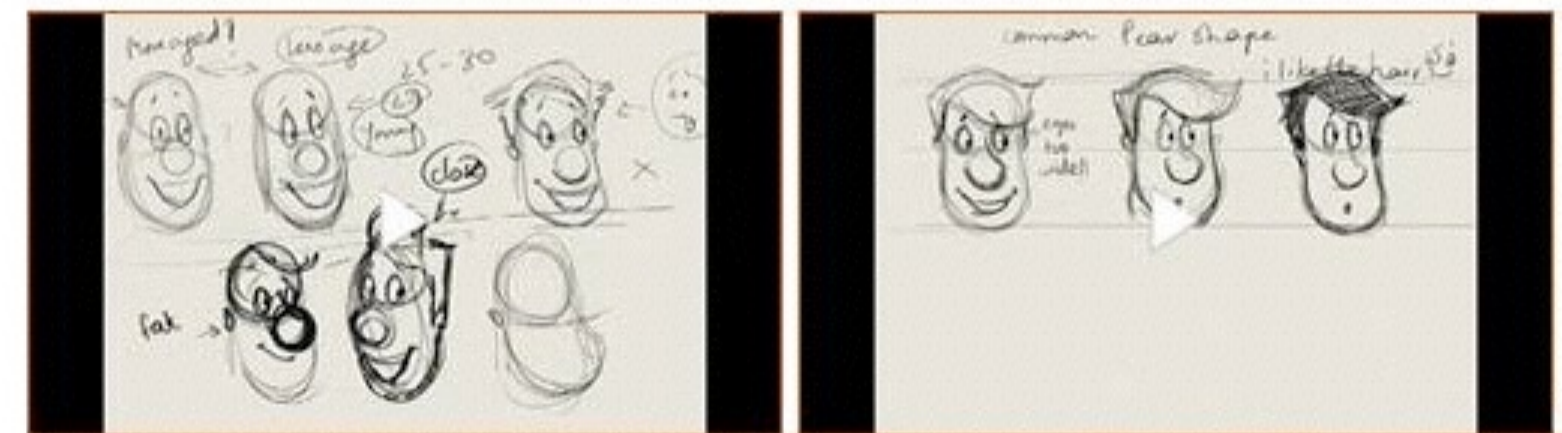
by
Professor Phani Tetali & Vajra Pancharia
Industrial Design Centre (IDC), IIT Bombay



Video:

- 00. Attributes and proportions
- 01. Expressions
- 02. Model sheet
- 03. Poses and gestures
- 04. Colors

Attributes and proportions



Expressions



Model sheet



DoD IIT Guwahati
IDC IIT Bombay
NID
Sponsored By
NME-ICT



Design Resource
Galleries
12 x 12 or bara by bara
by
Several Contributors
Open Design Resource Bank for
India



Course on Visual Syntactics - Tessellations

Understanding Visual Language
by
Ravi Poovaiah



Tessellations:

Slide show :

00. Tessellations

01. Introduction

02. Figure and Background

03. Design exercise

04. Further Links

05. Contact details

06. Comments and Feedback

07. Credits

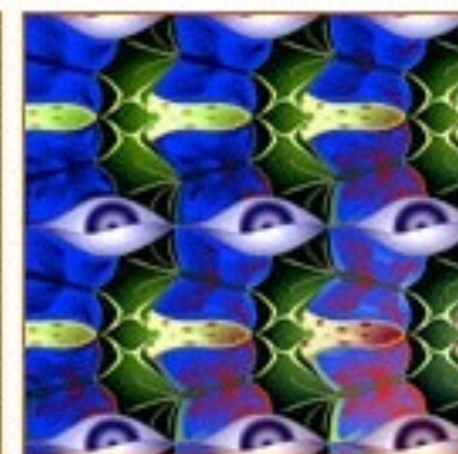
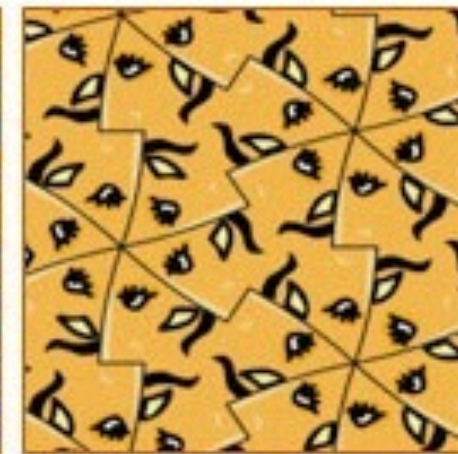
Other syntactic content:

08. Viewpoints

09. Abstraction

10. Meta-patterns

11. Substitution





Design Resources on Bell metal crafts of Sarthebari

The Craft of Utensils
by

Professor Ravi Mokashi Punekar, Menuolhoulie Kire and Tanima Das

Department of Design, IIT Guwahati



Bell Metal Crafts:

Process of making bell metal bowls and other items

Bell metal as a craft has survived for ages, yet there seems to be very little transition in the method of preparing bell metal items so far as Sarthebari is concerned.

The craftsmen who are also referred to as the Kahar or Orja still resort to the age old tools required for burning and shaping the metal.



- 00. Introduction
- 01. Making Process**
- 02. Bell Metal Items
- 03. Slide Show
- 04. References -links
- 05. Contact details
- 06. Comments and Feedback
- 07. Credits



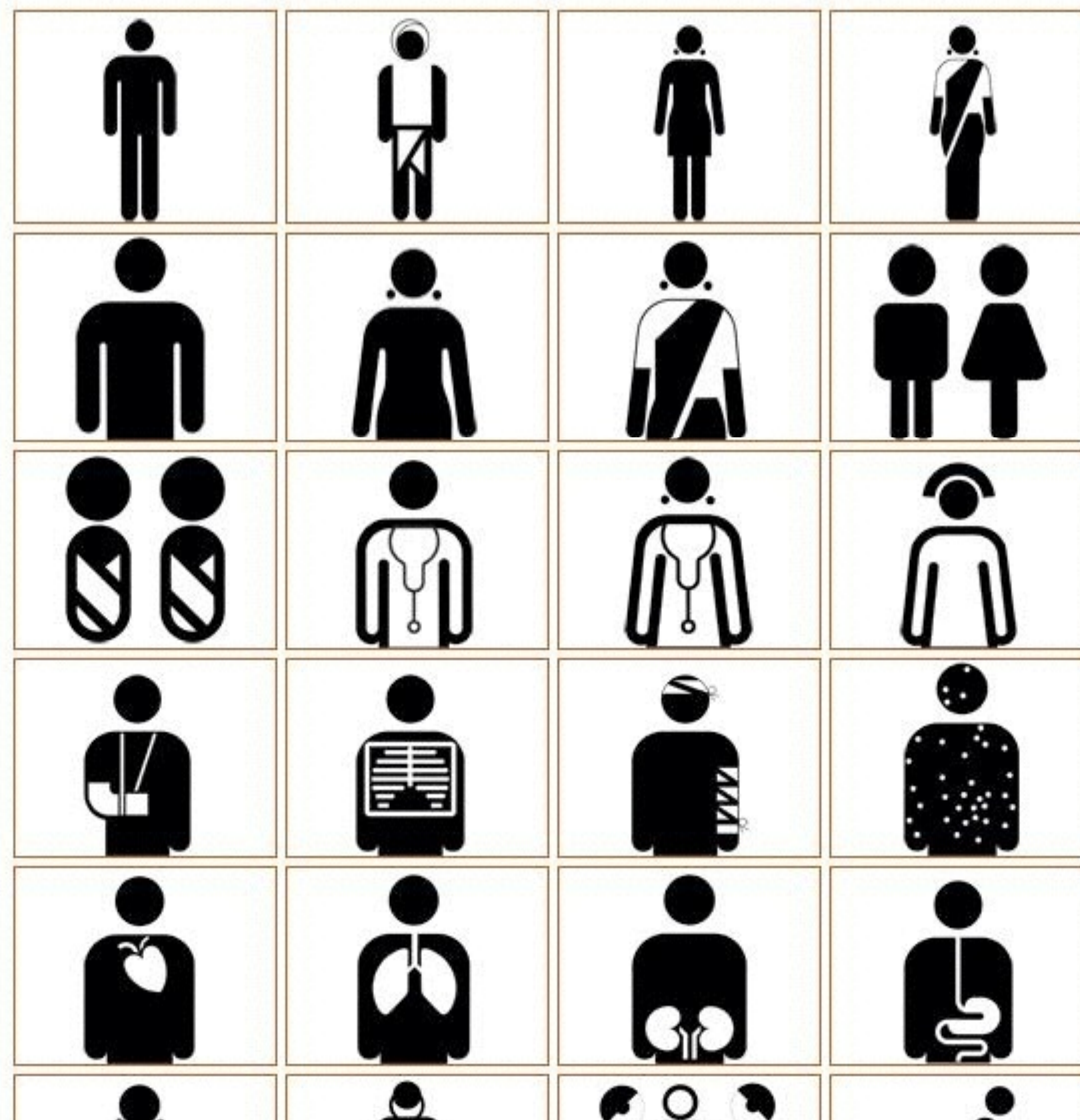
Design Course on Design of Signage

by
Professor Ravi Poovaiah
IDC, IIT Bombay



Hospital Symbols:

The graphic symbols were developed as part of a signage system for the various facilities in a public hospital environment.



- 00. Index
- 01. Introduction
- 02. Design Process
- 03. Case Studies
- 04. Symbol
- **04a. Hospital Symbols**
- 04b. Railway/Bus Stations
- 04c. Symbols for Buildings
- 04d. Symbols for Airports
- 04e. Symbols using Hands
- 05. Technology
- 06. Contact details
- 07. Comments and Feedback
- 08. Credits

Content

- Pedagogy and organization for individual Universities and autonomous Institutions
- Prof. Anup K. Ray, CET, IIT Kharagpur

Arbitrary Home Page of a Course Website: Prof. A. K. Ray

Course Name : Control Systems

Course ID : EE 302/10-11

Institute : XYZ Institute of Technology

Department : Electrical Engineering

Overview		Objectives			Summary		References Resources			Assignment		
C	M	C	M	U	M	U	C	M	U	C	M	U

Case Studies		Projects			FAQs			Ask Question			Self Assessment		
					C	M	U	A	V	Txt	C	M	U

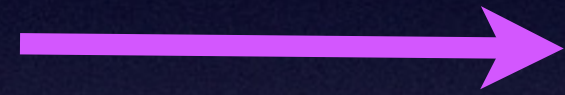
Form Groups		Add Comments			Simulation			Virtual Labs		
Take Notes		Add Resources								

Abbreviations : **C : Course** **M: Module** **U : Units**
 A : Audio **V : Video** **Txt :Text**

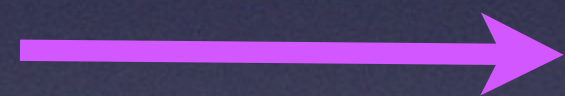
Technology Tools



*Free and open source Learning Management systems (Moodle, Brahaspati (IIT Kanpur))



*Free and open source video and audio recording and editing tools



*Free Webspace on social networking sites or educational networking sites--Classle in India,



*Free Webspace on clouds --Google with its coursebuilder, Sakshat website in India for hosting, IGNOU's learning content management sites

- Google Course Builder, one of the latest and free source for organizing course contents under a suitably defined pedagogical framework. Free cloud space provided and continuously being updated.
- NPTEL online certification programme (Feb 2014-July 2014) used this in the pilot phase soon.
- The next launch of a certificate course in September by IIT Kanpur and IIT Madras (Currently on).

Strategies for and challenges in effective e-learning

- * Continued access, easy and just-in-time
- * Set up social, peer-to-peer and faculty assisted networks and study groups
- * Encourage interactions and dialogues among learners
- * Collect continuous, course-specific feedback
- * Devise strategies for incorporating user feedback in the development process

Strategies for and challenges in effective e-learning

- * Bring in partners from industry and research organizations
- * Continuously upgrade the programme contents and move downward towards school education
- * Setup online and offline exams and certification as value add-on, to enhance employability in core industries

Technology Enhanced Learning

- * Promote critical thinking
- * Visualization and visualizability of concepts
- * Demonstration and hands-on experience
- * Building competitiveness, and think out-of-the-box at an early age.

- * Integration of teaching and learning in synchronization with the environment of the child/student/adult/all-time learners
- * Mass education and lack of physical infrastructure and teachers

- * Building a Nation to its fullest capacity— a nation as large as India, with one sixth of the world's population

Solve all the problems of education in India and obtain solutions for everyone in the world!

Thank you