

Half Day Workshop

On

Green Building Awareness

Under the
National Mission on Education through ICT

(MHRD, Govt. of India)

24th August, 2013

Conducted by IIT Bombay

in association with

Team Shunya (IIT Bombay + Academy of Architecture)

Course Coordinators:

Prof. Monika Jain
Prof. Jiten Prajapati
Prof. Jayant K Nayak
Prof. Swati Chokshi
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IIT Bombay and Academy of Architecture



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Introduction to the Workshop

A team of students from IIT Bombay and Rachana Sansad's Academy of Architecture (AoA) is participating in an international competition called the Solar Decathlon Europe 2014. The competition invites collegiate teams to design and build fully functional, attractive, affordable solar-powered houses. The team, named Team Shunya, is building a net zero energy house for the Indian middle class to address the housing and energy needs of the country's growing urban population. In order to promulgate awareness about sustainable construction, NME-ICT has collaborated with Team Shunya to create a half day workshop on Green Building Design and Technology. The aim of the workshop is to give a broad overview to Engineering and Architecture students across the country about the various facets of sustainable buildings.

Lectures will be given by IIT Bombay and AoA faculty. The participants attend at a remote center close to their own college. The lecture transmission and live interaction takes place through distance mode using the AVIEW technology and the internet, at selected remote centers across the country. This initiative is part of the National Mission on Education through ICT, supported by MHRD. Faculty coordinators are appointed at each remote center, to handle the technology infrastructure and other operational logistics.

There will be a total of 6 lectures of 25 minutes each with two interactive sessions of 45 minutes each. During the workshop, the participants at the remote center will get an opportunity to interact with the organizers. All the lectures and tutorial sessions are recorded. The final edited audio-visual contents, along with other course material will be released under Open Source. These contents can be freely used later by all teachers and students. The aim of this workshop is to educate upto a 1000 people about Green Building Technology in close to 50 remote centers across India.

The participants will also be able to interact with the relevant lecturers through an online platform (moodle) for a week before the workshop. The organizers encourage participants to interact with the instructor of the topic of their interest to be able to fully appreciate the nuances of green building design and be prepared with precise questions during the interaction sessions.

The course content along with other workshop details is given below.

Teaching Faculty

Prof. Monika Jain, IIT Bombay
Prof. Jiten Prajapati, Academy of Architecture
Prof. Jayant K Nayak, IIT Bombay
Prof. Swati Chokshi, Academy of Architecture
Prof. Rangan Banerjee, IIT Bombay

Special Lecture

Students of Team Shunya, Academy of Architecture and IIT Bombay

Duration and Venue

The workshop **will** be conducted on **24th August, 2013** from 9:30am to 1:30pm at IIT Bombay.

Note

Please note that this workshop is conducted under the eOutreach project of IIT Bombay. Live recording of the course and other created contents would be released under Open Source, through a portal. The recorded CD/DVD of the course lectures would be available for distribution at cost, to any individual/ institution. All participants are required to sign a No Objection certificate for such release of contents contributed by them during and after the workshop. All contributors will be acknowledged.

Course Fee

Since the workshop is funded by the National Mission on Education through ICT (MHRD, Government of India), there is no course fee for participation.

Who may benefit

The workshop is likely to benefit faculty colleagues and other participants at Engineering and Architecture colleges. This workshop is a premier to gauge the interest of the educational community for a more detailed training workshop focused on green building technology later in the year.

Course Content

Lecture 1: Buildings and Energy in India

Lecturer: Professor Monika Jain, IIT Bombay

Buildings contribute to one-third of the total energy consumption in India. With the rising urban population and booming construction sector, a rapid growth in buildings is expected in the next few decades. Steering this growth to more green and energy efficient buildings is hence of paramount importance to address the energy and climate change crisis. This lecture will give a macro level overview of the relationship between building sector and energy sector and touch upon the following topics:

- Energy production and consumption and the role of building sector in India
- Typical energy usage in buildings
- Life-cycle energy analysis of buildings
- Passive solar architecture and integration of sustainable technologies in buildings
- Green building rating systems
- Buildings, its occupants and the larger environment

Lecture 2: Context Sensitive Approach to Sustainable Building Design

Lecturer: Professor Jiten Prajapati, Academy of Architecture

Successful or appropriate design is that which meets the users' requirements and aspirations, is economical, safe, durable, aesthetically pleasing and socially relevant. The fast depletion of resources and environmental concerns has led to sustainability also becoming a major design issue. There is a growing concern to limit over consumption due to the increase in our technological prowess. We need to overcome our culture of use and throw, and replace it with reduce, reuse and recycle. This would help to ensure that our future generations have a better world to live in.

"We have not inherited the world from our forefathers but have borrowed it from our children" -

This lecture discusses the context sensitive approach to sustainable building design. Traditional wisdom has always propagated this approach, it just needs to be rediscovered or reinvented for contemporary times. Context in this lecture refers to climatic, regional, economical and technological. This is illustrated by case studies in a rural and an urban setting. The lecture will aim at answering the following questions:

- Is sustainable design difficult to achieve?
- What about cost?
- Does sustainable design restrict design freedom?
- Are there tools available?

The intention of this lecture is to help students, faculty and professionals to overcome misgivings about sustainable design. It should not be perceived as an obstacle but as an opportunity to design better, influence and develop new thoughts, as well as to enhance career prospects.

Lecture 3: Thermal Performance of Building

Lecturer: Professor J K Nayak, IIT Bombay

The quantification of the thermal performance of a building is desirable to evaluate various designs and help in evolving suitable design for realizing energy efficiency. The lecture would explain various heat exchange processes taking place in a building and external environment. Several techniques are available for estimating the performance of building. They would briefly be discussed and the type of results available would be indicated.

Lecture 4: The journey of sustainability-the Indian vernacular and beyond

Lecturer: Swati Chokshi, Academy of Architecture

Sustainability is not really an original concept; especially for Indians. Since generations, the idea of sustainability has pervaded every aspect of our lives and it has manifested itself in the built form as well.

And that's exactly what vernacular traditions are all about. There is a rich legacy of settlements, buildings and structures of all kinds and scales that are truly inspirational and living examples of sustainability. There

is a huge diversity of materials, climatic response and building technology as the country has a very varied terrain, geology and cultural diversity along with the climatic variations. So this is almost like a built encyclopedia that is a time tested proven technology that belongs to everyone and no one in particular.

However, a lot of things have changed in the recent past, the last century in particular. The major events that have changed life, the perspective towards it and particularly the approach to built forms and sustainability have been factors like an explosive population growth, urbanization, globalization, mass production and the accompanying consumerism and ease of transportation and of course, the dwindling finite resources. Along with these there have been inventions of new materials, building technologies and digital tools.

The question then, is how and to what extent can this source of vernacular be carried forward and how far is it applicable and in what ways. What is the way ahead for sustainability in the scenario where the population numbers and their lifestyle aspirations have the biggest impact on the morphology of settlements, the way people want their living and work spaces to function and the way architects respond to these stimuli.

Lecture 5: Renewable Energy options for Buildings

Lecturer: Prof. Rangan Banerjee

Buildings account for a significant portion of society's energy use. The end uses are cooking, space cooling, space heating, refrigeration, lighting, motive power and appliances. We review the renewable energy technologies available for meeting these loads – solar thermal, solar photovoltaics, wind, geothermal heat pumps and biomass gasification. We provide some examples of applications and indications of the advantages and barriers of the use of renewable energy for buildings.

Lecture 6: How we are building a solar powered house for India

Lecturer: Students from Team Shunya

This would be a brief lecture about the framework of the competition and the concept house that we have designed so far. The lecture would touch upon the need for sustainable construction to meet India's exponentially growing energy and housing demands. It also contains some information about the innovations made by the team of students to navigate this complex problem. Finally, we share some insights on the importance of building interdisciplinary design processes to reach an optimum solution that is both architecturally appealing and technically sound.

Important Note:

It is mandatory that the participant's Institute is well equipped to conduct the workshop through the NKN/ internet for a minimum of 30 participants.

It is also mandatory that the participants bring a document from the Heads of their institutes to the effect that the institute is willing to be part of this project.

How to Apply

Those wishing to attend this course should register online at <http://www.it.iitb.ac.in/nmeict>
Confirmation of registration will be sent by email. **Enrollment will be strictly online.**

LAST DATE FOR ONLINE ENROLLMENT: 19th August, 2013

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