SUSTAINABLE DESIGN COURSE

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SUSTAINABLE DESIGN COURSE FOR FUTURE ARCHITECTS

Students design passive architectural forms after learning the theoretical course in Architectural institute of FESTU last five years. Theoretical course of ARHITECTURAL CLIMATOLOGY (third year students, 60-75 people every spring) describe the main principles of Sustainable design (with the exception of natural constructions and plasters). I give more attention in my lections of modification the microclimatic conditions of open and closed space using previously architectural forms (Interaction of architectural and landscape forms with wind and sun).

One group of students (20-25 people) will be learning green design principles in practice during next three years.

GREEN DESIGN STEPS FROM SIMPLE FORMS TO DIPLOMA DROUGHT INCLUDE:

1. Direct gain of south facade only. First project with passive solar design - Settlement center (third year student projects, autumn). Passive solar design not compulsory, only for advanced students.
2.Simple architectural form with wind-break and solar heating possibility (A). Covers for kindergarten for 10-12 children (third year student projects, spring). Compulsory practice in framework of theoretical course.
3.Direct gain and natural ventilation of atrium space only. School for 250 pupils (four year student projects, autumn). Passive solar design not compulsory, only for advanced students.
4.Passive heating and cooling, hot water and space heating by solar water collectors; wind-break design of building and site (B). Low store dwelling or Single family house (four year student projects, spring). Compulsory use all methods of passive and active solar design. May be natural constructions and plasters.
5.Green design from passive and active solar heating to bionic exterior and interior imagine and "green" graphic style of documents. Public building - urban complex (five year student projects, autumn - spring). Green design not compulsory, only for advanced students.

After learning all green stages, advanced students will be ready for "Green diploma projects" (C), and future Green practice. The main part of diploma project besides draughts is the essay about Sustainable design principles.

There are three "green" graduate groups for the last five years: 2001, 2003, 2005 (June) - almost 60 students. And one group of 20 students will be in future - 2007, June.

All projects design for local climatic conditions of south Primorye, Russian Far East

Winter: November - March, north-north-west wind 7-12 m/s, up to 15 - 18 m/s; temperature -12 -20 C in January ; November and March approximately - 8 +8 C; all season sunny weather. Cold summer: April - June, south-east wind 5-7 m/s, up to 10 - 15 m/s; temperature +10 +16 C in June, up to +20 +22 C some sunny days; humidity 100%, usually cloudy. Summer: July - August, south-east wind 5-10 m/s, up to 15 - 20 m/s; temperature +20 +25 C, humidity 100%, usually rainy.

Deviation direction of wind by hills (50 -150 m, up to 200 meters) may be 45 degrees.

ECOBOX

ANGEL DE DIEGO RICA
MADRID, SPAIN. 2003

The Fundacion Metropoli building was conceived as an experimental building which integrates two fundamental criteria:
-The creation of a place of, and for the development of, innovation and creativity
-A commitment to bioclimatic processes

BIOCLIMATIC COMPONENTS
Sun Scoops-In addition to capturing solar energy for the building, the sun scoops also act as skylights permitting the passage of heat throughout the winter months and reflecting light in the summer.
Thermal Energy Storage-The building enclosures are composed of materials which maximize its energy efficiency and saving. The thick outer walls act as thermal energy stores that regulate the temperature within the building
Ventilation and Geothermal Energy-Underground geothermal energy is transmitted and stored in the thermal energy storage (a two-meter deep gravel pit) located underneath the building. Air from the exterior is allowed to heat up or cool, depending on the season, by passing through this energy storage. The heated/cooled air is then introduced into the interior spaces and building enclosure.
The Atrium and Motorised Windows-The building is maintained in positive pressure outward due air that is introduced from the exterior through the ventilation system.

Louvers -The automatic louvers that are fitted around the structure allow personalized control of luminosity and direct solar radiation into the building. Photovoltaic Panels integrated with the Facade Solar Panels-Production of heat and cold.

Vapour Absorption Chiller-In the summer, the vapour absorption chiller uses the hot water produced by the solar panels for the production of cold water for the radiant floors
Radiant Floors and Ceilings-The radiant heating and cooling system circulates hot and cold water through underfloor tubing. During the winter, the hot water comes from the solar panels, while in the summer; the system uses the same water that has been cooled by the vapour absorption chiller.

Intelligent Regulation Systems -In general, the electrical systems monitor and regulate building temperature depending on the needs of the different interior spaces, the external thermal conditions and the energy accumulated from the solar panel and photovoltaic cells.

Obtained Results
Energy Savings of 70 %