DEPARTMENT OF ARCHITECTURE
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

Name of the programme	**Master of Architecture (Energy Efficient and Sustainable Architecture)**		
Course Title	**SOLAR PASSIVE ARCHITECTURE**		
Course Code	**AR 705**	**Credits**	**03**
Department	**Architecture**	**Faculty**	**Dr D.Kannamma**
Pre-requisites Course Code	-		
Session	**July 2022**	**Section**	**NA**
Course Coordinator(s)	NA		
Course Teacher / Tutor E-mail	**kanama@nitt.edu**	**Tel. No.**	**0431 – 250 3566**
Course Type	√ **Core course** □ **Elective course**		

Syllabus (approved in BoS)

Classification of passive cooling systems according to the major natural source from which the cooling energy is derived. Minimizing cooling needs by building design: building shape & layout, orientation, size of windows, shading of window, colour of the envelope and climatic impact of plants around building.
Radiative cooling –The earth as a cooling source for buildings. Cooling of attached outdoor spaces. Passive solar configuration – outline of various passive systems for heat gain. Direct Gain, Indirect Gain – Trombe wall, Water wall and Transwall. Sun space / attached solarium / conservatory. Roof Pond / Skytherm – Vary Therm Wall – Earth sheltered / earth bermed structures and earth-air tunnels. The use of earth-air tunnels to heat or cool the buildings.

ESSENTIAL READINGS:

1. Allard, F. and M. Santamouris. 1998. Natural Ventilation in Buildings.
2. Argue, R. 1981. Super-insulated Retrofit Book.
3. Auliciems, A. and S. V. Szokolay. 2007 [1997]. Thermal Comfort. www.arct.cam.ac.uk/PLEA/Download.aspx?p=9&rcid=10&ix=6
4. Bainbridge, D. A., Corbett, J. and J. Hofacre. 1979. Village Homes' Solar House Designs.
5. Boubekri, M. 2008. Daylighting, Architecture and Health.
6. Butti, K. and J. Perlin. 1980. A Golden Thread.
7. Elizabeth, L. and C. Adams. 2000. Alternative Construction: Contemporary Natural Building Methods. John Wiley.
8. Falk, B. and B. Guy. 2007. Unbuilding.
9. Geiger, R., R. H. Aron and P. Todhunter. 2009. The Climate near the Ground. Older 1950 edition on line at http://www.archive.org/details/climatenearthegr032657mbp
10. Givoni, B. 1994. Passive Low Energy Cooling of Buildings.

COURSE OBJECTIVES

1. Integrate each student's unique experience and background into this class.
2. Understand the interaction of cultures (developed/less developed), the economy, energy, the environment, and historical and future building practices and development patterns.
3. Relate economic and environmental constraints to the role of passive solar architecture in future development patterns, redevelopment of existing cities and buildings, and sustainability.
4. Develop increased respect and understanding of traditional practices, "others" and especially the skill and intelligence needed for subsistence and survival in difficult and changing environments.
5. Apply critical analysis skills to passive solar architecture design problems, research, and resource management.
6. Identify, interpret and present important information for classmates.
7. Understand the inter-relatedness of all things and the importance of systems thinking to solve complex problems and develop sustainable buildings and planning guidelines.
8. Learn to work well with teams in analysing and presenting discussions and displays of important concepts in passive solar architecture.

COURSE OUTCOMES (CO)

Course Outcomes	Program Outcome (PO)
1. Demonstration of a global outlook and understanding of passive solar architecture and sustainable building. 2. Understanding of the interconnectedness and interdependence of windows, thermal mass, building shell, microclimate and sun path, and occupant behaviour on comfort and performance. 3. Understanding of the interdisciplinary nature of passive solar and sustainable architecture. 4. Skill in critical thinking to assess the quality of information and its importance. 5. Understanding of pending resource supply and climate change crises and implications of passive solar architecture for the future.	

COURSE OVERVIEW

This course reviews the foundations and principles of passive solar architecture and Sustainable building.
It reviews the opportunities for more sustainable buildings that provide better comfort, more healthful conditions and increase productivity while improving management of resources, particularly energy, water, and materials.
The goal of this course is to help students develop a better understanding of the practice of passive solar architecture, sustainable building, ecological economics, and approaches that can be used to manage resources more sustainably while improving the quality of life for people.

COURSE TEACHING AND LEARNING ACTIVITIES

No	Week	Topic	Mode of Delivery
1	1 - 3	Global perspective of energy. A brief history of energy use, Building metabolism and embodied energy.	Lecture
2	4 – 6	Site and microclimate. Passive solar heating, Solar control, Passive cooling using microclimate resources.	Lecture
3	7 – 16	Integrated design, building analysis, Daylighting, Resource harvesting buildings, Water, Electricity. Community design for sustainability and resource efficiency.	Lecture

COURSE ASSESSMENT METHODS

No	Mode of Assessment	Date / Week / Month	Duration	%
1	Assignment 1	Week 3	Two Weeks	25
2	Assignment 2	Week 6	Two Weeks	25
3	Test	Week 12	One Hour	20
5	Compensatory Assessment	As per Academic Calendar	One Hour	20
4	End Semester Examination	As per Time Table from Dean Academic office	As per Instruction from Dean Academic Office	30

COURSE EXIT SURVEY

1. Feedback survey about course content and suggestions for any improvement / modification – online.
2. Assessment of the knowledge the students gained through this subject – online.
3. Feedback regarding the teaching – learning process – online.

COURSE POLICY

1. A minimum of 30% should be scored in the final assessment (for all courses) for a pass. The passing minimum fo all the courses shall be the maximum of 35% or Class Average/2 (https://www.nitt.edu/home/academics/rules/PG Regulations-2019.pdf).
2. Students are to follow the given schedule for each project and submissions are to be made on time.

MODE OF CORRESPONDENCE

The faculty member is available for consultation during working hours on all working days. The students can also e-mail their queries to **kanama@nitt.edu**.

COMPENSATION ASSESSMENT POLICY

If a student is unable to submit assignment / write test due to genuine reasons can compensate by submitting assignment / Writing test during the compensation assessment period (based on academic calendar).

ATTENDANCE POLICY

1. **At least 75% attendance is mandatory.**
2. **A maximum of 10% is allowed under On Duty (OD) category.**
3. Students with **less than 65% of attendance** shall be prevented from writing the final assessment and **shall be awarded 'V' grade.**

ACADEMIC DISHONESTY & PLAGIARISM

No form of Plagiarism and Academic Dishonesty can be accepted. Students who indulge in such activities will be strictly punished.

FOR SENATE'S CONSIDERATION

Course Faculty 16/09/2022 **CC-Chairperson** **HOD** 16/09/22