



Department of Architecture

Course: MSAR112 - Building Physics and Sustainability	Class: I M. Arch(SA), I Sem, A.Y. 2024-25
Instructors: Dr. Lilly Rose A	Internal Assessment: 50
Contact Periods/ week: 03 periods.(55 min each)	External Theory Exam: 50
Time Table: Friday 09:00am - 11:45pm	Total Marks: 100
Attendance: Min 75%	Credits: 3
Min. Passing Marks: 50% each in Internal & External Assessment and 50% in Aggregate	

Objective: The aim of the course is to introduce climatic and building physics parameters and understand the role of building physics in designing a climate responsive and energy efficient building for enhanced occupant comfort.

Out Line of the Course:

LECTURE PLAN

WEEK	DATE	TOPIC OF CLASS LECTURE & DISCUSSION	TOPIC OF STUDIO WORK& ASSIGNMENTS / REMARKS
1	Week-1 16-08-2024	Earth-Sun relationship, Global Climate, Climatic zones in India, Analysis of macro & micro climate.	Lecture + Introduction to Sun path analysis using software
2	Week-2 23-08-2024	Interpretation of climatic data through Climate Data, Solar Path Charts, Psychrometric Charts, Bioclimatic charts.	Lecture + inclass activity
3	Week-3 30-08-2024	Thermal Comfort in Built environments and Thermal comfort indices, operative and comfort temperatures, Adaptive thermal comfort	Lecture + inclass activity
4	Week-4 06-09-2024	Use of instruments like data loggers/ anemometer for thermal/ wind data recording and carrying out related studies/exercises.	Visit to Climatology lab and demonstration of instruments
5	Week-5 13-09-2024	Book Review	Library Visit for Book Review
6	Week-6 20-09-2024	Heat insulation, absorptivity, emissivity, reflectivity, thermal conductivity, thermal damping, thermal performance index, thermal resistance, thermal transmittance, thermal time constant and time lag.	Lecture + Numericals
7	Week-7 27-09-2024	Thermal behaviour of multi layers: body, surface conductance, air-to-air resistance, cavity resistance, solar control, radiation calculations, solar heat gain - periodic heat flow calculations	Lecture + Numericals
8	Week-8 04-10-2024	Mid Semester week	Mid Semester Examination
9	Week-9 11-10-2024	Calculation of principle building energy gains and losses. Estimation of building energy performance for heating and cooling for different climatic contexts.	Lecture + introduction to Opaque 3.0 software for thermal analysis / Exercises
10	Week-10 18-10-2024	Calculation of principle building energy gains and losses. Estimation of building energy performance for heating and cooling for different climatic contexts.	Lecture + introduction to Opaque 3.0 software for thermal analysis / Exercises

11	Week-11 25-10-2024	Radiation versus other Heat Transfer Methods, Evaluating various built form (Vernacular, State of art and other buildings) and its components / or materials for comfort conditions with respect to thermal, visual and air movement.	Lecture + inclass activity
12	Week-12 01-11-2024	Radiation versus other Heat Transfer Methods, Evaluating various built form (Vernacular, State of art and other buildings) and its components / or materials for comfort conditions with respect to thermal, visual and air movement.	Lecture + Inclass activity / Excercises
13	Week-13 08-11-2024	Field study, data collection and thermal comfort analysis.	Assignment 1: Field study and analysis
14	Week-14 15-11-2024	Guru Nanak Jayanthi	Holiday
15	Week-15 22-11-2024	Field study, data collection and thermal comfort analysis.	Field study and analysis
16	Week-16 29-11-2024	Adaptive thermal comfort survey and analysis of results.	Field study and analysis

S. No.	Stages of Evaluation	Weightage in %
1	Internal assessment (assignments, exercises, seminar etc.)	30
2	Mid-semester Examination	20
3	End Semester Examination	50
	Total	100

Reference Books:

- 1.Hens, H. S. L. C. (2023). Building Physics - Heat, Air and Moisture: Fundamentals, Engineering Methods, Material Properties. With Exercises. Germany: Ernst & Sohn.
- 2.Pinterić, M. (2021). Building Physics: From Physical Principles to International Standards. Germany: Springer International Publishing.
- 3.Martin Zeumer, Sebastian El Khouli, and Viola John (2015), ‘Sustainable Construction techniques’, Detail Green Books., First Edition.
- 4.Mark DeKay (2011), ‘Integral Sustainable Design: Transformative Perspectives’, Earthscan., First Edition.
- 5.Andrew Scott (1998), ‘Dimensions of Sustainability’, E & FN SPON, Routledge.
- 6.K. Steemers and Nick Baker (2000), ‘Energy and Environment in Architecture: A Technical Design Guide’, Taylor & Francis.
- 7.David Thrope (2014), ‘Energy Management in Buildings: The Earthscan Expert Guide’, Routledge.
- 8.Marko Pinterić (2017), ‘Building Physics: From physical principles to international standards’, Springer.
- 9.T.R.Oke (2002), ‘Building Layer Climates’, Second Edition, Routledge.
- 10.Steven V. Szokolay, Introduction to Architectural Science: The basis of sustainable design, Architectural Press, 2004.
- 11.DeKay, M., & Brown, G (2001), Sun, Wind & Light: architectural design strategies, Tehran: Parham Naghsh.

Course Instructor:

(Dr. Lilly Rose A)

Head of Department:

(Dr. Srinivas D)