

ARK590 – Building Climatology for Sustainable Design

Elective Course - Spring 2020- period 3 and 4

Department of Architecture and Civil Engineering

Venue: **SB1**, floor 2, room **R-245**, exceptions: **SBK-456** on March 4 and **SB-S393** on May 13

General

Changing climate causes demand on actions to address both the mitigation of changes and adaptation of building stock to them. Choosing a strategy for low energy building based on integration of the building form and structure with its external environment assumes taking advantage of natural resources (wind sun etc.) to secure comfort. It is an example of design decisions leading toward mitigation of climate change. Building climatology supports architect to use passive design strategies for heating, cooling and ventilation, treating the climate as a resource. It is an interdisciplinary approach involving knowledge from the fields: climatology, building physics, physiology, and architecture.

The intended learning outcomes

After the course you are expected to be able to:

- To **understand climate**, the consequences of climate change, the concept of climate change mitigation and adaptation.
- To **understand the principles of building climatology with focus on physical phenomena** that govern building performance, to be able to negotiate passive/hybrid strategies in building design.
- To **explain** the performance of **vernacular architecture** in relation to local environmental conditions (climate, topography, local resources), perception of comfort and living style.
- To be able to **generalize the findings** in terms of "sustainable design" in contemporary context.
- To **communicate** analyses in the proper format of written report and a short ppt. presentation.

Schedule

	Wednesday 26/2 (245)	Wednesday 4/3 (456)	Wednesday 11/3 (245)	Tuesday	Wednesday 22/4 (245)
8.00 – 11.45	8.00 – 11.45 Breaks 8.45, 9.45, 10.45 Lectures and workshop <i>11.45 – evaluation group</i>	8.00 – 11.45 Breaks 8.45, 9.45, 10.45 Lectures and workshop	8.00 – 11.45 Breaks 8.45, 9.45, 10.45 Lectures and workshop	8.00-11.45 Self-study	8.00 – 11.45 Breaks 8.45, 9.45, 10.45 Workshops <i>11.45 – evaluation gr.</i>
13.15 – 17.00		13.15-17.00 Individual/group study on assignment	13.15-15.00 Workshop Individual/group study	13.15-17.00 Self-study	13.15-17.00 Individual/group study on assignment
Subject	Course Intro Climate challenges Building Climatology	Building and Climate	Comfort, interior Passive strategies	Assignment	Passive strategies

	Thursday 30/4	Wednesday 6/5 (245)	Wednesday 13/5 (393)	Friday 22/5
8.00 – 11.45	8.00-11.45 Self-study	8.00 – 11.45 Breaks 8.45, 9.45, 10.45	8.00-11.45 Concluding seminars Breaks 8.45,9.45,10.45	8.00-11.45 Self-study
13.15 – 17.00	13.15-17.00 Self-study	13.15 – 17.00 Individual/group study on assignment	13.15-15.00 Concluding seminars Break 14.00	13.15-17.00 Self-study
Subject	Assignment	Passive/Vernacular Hybrid/Modern Sustainable Architecture	Concluding seminars based on ppt presentations	Final Report Delivery

The main Assignment

To find and present/explain the examples of climate responsive traditional and modern architecture in relation to the general principles of building climatology.

The traditional building has been developed from adaptation to a local climate and to a site, in order to create a comfort zone for human life and an interior climate making use of passive strategies and local materials. The traditional buildings we find all over the planet inform a deeper understanding of why we in Sweden have adopted the passive house technology while it maybe is not desirable in hot humid climates.

Working process

- Step 1** Planning for the individual work in a collaborative environment
- Step 2** Find and describe **a traditional building** adapted to the chosen climatic zone. Describe climate with the local data (wind, temperature, humidity). Use psychrometric chart.
- Step 3** What do these buildings do for the comfort of their inhabitants? Make use of the Bioclimatic chart (psychrometric chart with superimposed comfort zone) to describe the relation between climate and comfort zone. Explain differences between “night and day”, “summer and winter”. **Which passive strategies** for heating, cooling or ventilation are applied?
- Step 4** Elaborate on the relationship between place, technology, and the way of living for the chosen building.
- Step 5** Find and describe **one modern** spectacular climate responsive building (possible in collaboration with your colleague) – reflect on the passive/hybrid strategies used in relation to bioclimatic chart.
- Step 6** Prepare a short digital presentation and a final report.
- OBS! Attach a report and your presentation on Canvas folder*
State clearly the names of the group members that have contributed to the study if relevant

Final report

The final paper/report should be an academic text. Complete with references (APA). Additionally you are going to include diagrams and illustrations/photos. Feel free in choosing the way you communicate the results of the analysis.

Grading

Grading: 5, 4, 3, fail, related to the level of meeting learning outcomes, their communication through the assignment and personal activity will be applied.

The examiner will consider: the assignment, contribution in a group assignment if relevant, extra responsibilities and tasks, activity in the class, responsible attitude to the presence at the lectures/workshops and to the deadlines.

Literature

Manzano - Agugliaro F., Montoya F.G. Sabio Ortega A., García-Cruz A. (2015). Review of bioclimatic architecture strategies for achieving thermal comfort. [*Renewable and Sustainable Energy Reviews*. Vol. 49, pp 736-755, Elsevier.](#)

Optionally, some sections from:

Szokolay S. (2004) Introduction to architectural science – the basis of sustainable design. Architectural press. Elsevier.