



# Sun and shadow – Heliodon

(Resource ID: 205)

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This teaching resource is allocated to following University:

**BOKU – University of Natural Resources and Life Sciences Vienna**

Institution:

**Institute of Meteorology (BOKU Vienna)**

<http://www.sustainicum.at/en/modules/view/205.Sun-and-shadow-Heliodon>



**Individual work**  
**Group work**  
**Plenum**



**Independent of  
the number of  
students**



**15 to 30 min**



**English, German**

A heliodon is an instrument to measure solar geometry and its effect on the exposure of objects to sunlight, as well as the shading effect of objects.

The geometry of object's exposure to solar radiation at various points on the Earth's surface is based on spherical geometry. Due to the angle of the Earth's axis (declination) the Earth experiences seasons. Seasons are a consequence of energetic radiation reaching the surfaces of the Earth. This geometrical particularity and its effect are not easily understandable. In order to make the topic as accessible as possible, various tools (such as the heliodon) were created to make understanding solar exposure and shading simpler.

The heliodon structure is around 1 x 1 m (the hoop for the sun's orbit), making it possible to easily transport to a lecture hall for demonstration

purposes. The sun is represented by an adjustable LED light with as many targeted lighting characteristics as possible, allowing it to be adjusted manually for each season, time of day and geographic latitude. By changing the individual parameters the effect on sun exposure and shading is immediately visible and understandable.

Objects can be placed on the central platform. Many objects (wooden building blocks, model trees) are found in, and can be taken from, the box of building blocks. A small, integrated video camera allows the presentation of the results to be seen in large lecture halls with large audiences; however direct use by students in the form of an assignment is ideal.

The heliodon, user handbook, and box of model building blocks can be used for demonstration purposes in a lecture or loaned out for use in seminar courses and practical exercises.

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## Teaching Tools & Methods

formteaching\_experiment

## Contact details for borrowing physical devices

Email to Author

## Learning Outcomes

- Illustrate sun and shade geometry on models.
- Understand geometrical relationships

## Relevance for Sustainability

The environment with sunlight (solar radiation) is, from a natural history perspective, the most important factor for sustainable planning. An understanding of the geometrical conditions is an absolute prerequisite for creating sustainable solutions.

## Related Teaching Resources

No specific previous knowledge / related resources required

## Preparation Efforts

Low

## Access

Free

## Sources and Links

Lechner Norbert, 2008: Heating, Cooling, Lightning: Design Methodes for Architects. John Wiley & Sons, Auflage 3

Olgyay Aladar and Olgyay Victor, 1997: Solar Control and Shading Devises. Princeton Univ. Pr.

Egan, M. David and Olgyay Victor, 2000: Architectural Lighting. 2ed, McGraw Hill Higher Education.

Oke, T.R.: 2001: Boundary Layer Climates. 2ed, Cambridg Univ. Pr.

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