Academic Year: 2019/2020

Course: Urban Climatology

Coordinator: António Lopes

Teaching Staff: António Lopes

ECTS: 6 Weekly Hours: 2,5 Typology: Theoretical and practical

Contents

1. Climate as part of the urban environment
   Introduction to the study of urban climate; Data acquisition for urban climate studies; Climatic data statistical treatment.
2. Main characteristics of the urban climate
   Urban energy balance, Thermal consequences: the urban heat islands and park cool islands; Hydrological balance in urban areas; Wind field modifications in urban areas; Air quality and pollution in urban areas
3. Urban Climate and global changes of climate
   Global changes of climate. “Global warming”. Natural and human causes. IPCC’s projections for 2100; Influence of cities on “global warming”; Influence of “global warming” on urban climate.
4. Applied urban Climatology
   Urban climate and environmental quality of life; Urban climate and planning; Adapting to climate change issues.

Objectives and skills

Objectives: Within this course the students should understand: i) the main characteristics of the urban climate and their implications in global changes, namely the “global warming”; ii) the specific methods and data needed for the urban climate studies; iii) the consequences and risks of the urban climate; iv) the strategies to adapt the cities to climate change in urban environments and the urban planning solutions;

Skills: At the end of the course the students should be able to: i) know how to obtain mesoscale and microscale climatological data; ii) apply statistical and modeling methodologies in urban microclimate scale, recognizing software limitations and potentialities; iii) use an open source bibliographic management software (Mendeley – Academic Reference Management for Researchers; iv) communicate scientific results and to write scientific papers with international standards.

References

Alcoforado MJ, Lopes A, Andrade H, Vasconcelos J, (2005) Orientações climáticas para o ordenamento em Lisboa, Geo-ecologia, 4, CEG, Lisboa.

Alcoforado, MJ (2010) – Climatologia urbana para o ensino. Núcleo CliMA, rel.3, Centro de Estudos Geográficos, Lisboa.

Alcoforado, MJ, Andrade, H, Lopes, A, Vasconcelos, J (2009) – Application of climatic guidelines to urban planning. The example of Lisbon (Portugal). Landscape and UrbanPlanning, 90(1-2): 56-65.

Lopes A (2009) O sobreaquecimento das cidades. Causas e medidas para a mitigação da ilha de calor de Lisboa. Territorium, 15: 39-52.

Lopes A, Alves E, Alcoforado MJ, Machete R, (2013) Lisbon Urban Heat Island Updated: New Highlights about the Relationships between Thermal Patterns and Wind Regimes, Advances in Meteorology, Hindawi, Article ID 487695:11.

Oke, T. R., Mills, G., Christen, A., & Voogt, J. A. (2017). Urban Climates. Cambridge: Cambridge University Press.

Rosenzweig, C., Solecki, W., Romero-Lankao, P., Mehrotra, S., Dhakal, S., & Ali Ibrahim, S. (Eds.). (2018). Climate Change and Cities: Second Assessment Report of the Urban Climate Change Research Network. Cambridge University Press, Cambridge.

Knowledge evaluation methods and their partial grades

To be approved the students must accomplish 2 (two) theoretical and practical tests (25% each) and 1 (one) oral presentation (40%). 10% should be given to the student progression in the practical classes.