



INSTITUTO DE HIGIENE E
MEDICINA TROPICAL
DESDE 1902

CLIMATE CHANGE AND VECTOR-BORNE DISEASES: METHODOLOGICAL APPROACHES

CU characterization:

CU name:

Climate change and vector-borne diseases: methodological approaches

Scientific area acronym:

PA

Duration:

Semestral

Working hours:

58

Contact hours:

30

ECTS:

2

Observations:

Optional CU

Teacher in charge and respective teaching load in the CU:

Carla Sousa - 7.5 hours

Other teachers and respective teaching load in the CU:

Teresa Novo - 2.5 hours

Invited teachers – 28.0 hours

Intended learning outcomes (knowledge, skills and competences to be developed by the students):

At the end of this Curricular Unit the participants should have acquired advanced knowledge on the main insect-borne diseases and its transmission mechanisms in order to, based on various "hands on" methodologies:

1. Design and implement methods for collecting environmental information and bionomical parameters of insects with medical importance.
2. Use, autonomously, GIS tools for modelling vectors distribution.
3. Develop predictive models for current and future geographic distributions of insect-vectors of human diseases and discuss the results in terms of their epidemiological



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consequences.

Syllabus:

- I. Main insect vectors of human diseases: their biology, ecology and distribution.
- II. Modes of transmission of the main pathologies and relevance of entomology in its epidemiology.
- III. Introduction to the use of Geographic Information Systems (GIS) and examples of its application in modelling the distribution of insect vectors of diseases.
- IV. Effects of environmental variables in the bionomics of vectors, using as model: the mosquitoes.
- V. Collection and preparation of biological and environmental data required for modelling vectors distribution.
- VI. Implementation of a predictive statistical model for the distribution of vectors and its validation methods.
- VII. Scenarios of climate change and biological changes resulting from the first. Modelling of vectors future distributions vrs climate changes.
- VIII. Impact of future vectors distribution in the epidemiology of the diseases they transmit.

Teaching methodologies (including assessment):

Teaching methodologies

- Lectures (6.5 h), theoretical-practical classes (17.5h).
- Tutorial guidance (6.0h).

Course will be composed by 5 theoretical lectures and 7 theoretical-practical classes where the demonstrative and active methods will be applied. In these theoretical-practical classes, students will work, essentially, in a digital environment with computer tools associated with geographic information systems and modeling in R.

There will also be tutorial sessions to support self-study, the solution of the practical exercises and the preparation of the written assignment.

Student's evaluation will be based on two components:

1. Moodle-based practical exercises or questionnaires, which represent 25% of the final grade.
2. Development of a predictive model for vectors distribution according to data provided by teachers and presented in the form of a written work of about 2000 ± 200 words (excluding graphs and bibliography). It represents 75% of the final grade.

In order to improve their grade, or in case of failure, the students will need to perform a new written assignment that will represent 100% of the final grade.

The evaluation of the UC and its teaching staff will be carried out through an anonymous student's satisfaction questionnaire.



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References for consultation / mandatory existence:

- Elith, J. and Leathwick, J. (2009). Species distribution models: ecological explanation and prediction across space and time. *Annual Review of Ecology, Evolution, and Systematics*, 40, 677697. [free access]
- Franklin, J. and Miller, J.A. (2009). *Mapping species distributions: spatial inference and prediction*. Cambridge University Press Cambridge.
- Wernsdorfer W.H. (1988). *Malaria. Principles and practice of malariology*. Churchill Livingstone Inc. London. UK.
- Powerpoint presentations, pedagogical resources on the Moodle platform, specific bibliography for each class.