The Hebrew University of Jerusalem

Syllabus

Eco-hydrologic modeling with R - 68806

Last update 19-09-2016

HU Credits: 2

Degree/Cycle: 2nd degree (Master)

Responsible Department: hydrology and water resources

Academic year: 0

Semester: 1st Semester

Teaching Languages: English

Campus: E. Safra

Course/Module Coordinator: Neomi Kristina Tag

Coordinator Email: ctague@bren.ucsb.edu

Coordinator Office Hours: by appoitment

Teaching Staff:

Prof Naomi Christina Tague
Prof Efrat Morin

Course/Module description:
Eco-hydrology is the study of interactions among climate, hydrology and ecological productivity and biogeochemical cycling. One of the main tools used in eco-hydrology is computer based simulation modeling. These models combine data and theory to understand how plants and water interact and how decisions that people make alter water resources and plant and ecosystem health. This course will provide an overview of hydrologic and eco-hydrologic models and their applications. The course will cover both designing a new model and selecting, calibrating and evaluating existing models. This is a skills based course and we will use R (a data analysis and programming environment and a version control system (github) as way of keeping track of model changes). The course will provide an introduction to R and the use of R in environmental modeling and analysis and will include weekly assignments, presentations and a final project.

Course/Module aims:
a) Familiarity with some common hydrologic and ecohydrologic models
b) Techniques for designing, testing, calibrating and visualizing results from these models in the R programming environment

Learning outcomes - On successful completion of this module, students should be able to:
a) Understand the different types of eco-hydrologic models and how to select the appropriate model for a specific application
b) Ability to use R to build a simple model of a ecologic or hydrologic process
c) Ability to use R to calibrate and test a eco-hydrologic model
d) Ability to use R to analyze and display model results

Attendance requirements(%):
80% attendance at weekly lectures is required

Teaching arrangement and method of instruction: Lecture, in-class and take-home assignments, presentation and final project

Course/Module Content:
a) Overview of Hydrologic and Ecohydrologic models - Intro to R and version control

b) Tools for building models in R and 1-d hydrology model
c) Model calibration (in R) - including the use of Generalized uncertainty analysis
d) Modeling eco-hydrology as a coupled system: RHESSys (ecohydrologic model) as an example
e) Ecohydrologic model applications -climate and land cover change - Visualizing output in R
f) Scaling in ecohydrology

Required Reading:
Weekly reading to be distributed in class

Additional Reading Material:
a) Rainfall-Runoff Modelling: The Primer, Keith J. Beven, Wiley-Blackwell
b) Ecohydrology
Vegetation Function, Water and Resource Management, Derek Eamus, Tom Hatton, Peter Cook, and, Christine Colvin, CSIRO Publishing
c) R-tutorials
https://cran.r-project.org/doc/manuals/R-intro.html

Grading Scheme:

Additional information:
None