DEGREE CURRICULUM

ST IN MULTI-SCALE FOREST DYNAMICS MODELS

Coordination: AMEZTEGUI GONZALEZ, AITOR

Academic year 2023-24

ST IN MULTI-SCALE FOREST DYNAMICS MODELS 2023-24

Subject's general information

<table>
<tr><td>Subject name</td><td>ST IN MULTI-SCALE FOREST DYNAMICS MODELS</td></tr>
<tr><td>Code</td><td>111006</td></tr>
<tr><td>Semester</td><td>ANUAL CONTINUED EVALUATION</td></tr>
<tr><td>Typology</td><td>
<table>
<tr><th>Degree</th><th>Course</th><th>Character</th><th>Modality</th></tr>
<tr><td>Master's Degree Erasmus Mundus in Spatial and Ecological Modelling in European Forestry</td><td>2</td><td>OPTIONAL</td><td>Attendance-based</td></tr>
<tr><td>Master's Degree Erasmus Mundus in Spatial and Ecological Modelling in European Forestry</td><td></td><td>OPTIONAL</td><td>Attendance-based</td></tr>
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<tr><td>Course number of credits (ECTS)</td><td>5</td></tr>
<tr><td>Type of activity, credits, and groups</td><td>
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<tr><th>Activity type</th><td>PRACAMP</td><td>PRALAB</td><td>TEORIA</td></tr>
<tr><th>Number of credits</th><td>1.5</td><td>1.5</td><td>2</td></tr>
<tr><th>Number of groups</th><td>1</td><td>1</td><td>1</td></tr>
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<tr><td>Coordination</td><td>AMEZTEGUI GONZALEZ, AITOR</td></tr>
<tr><td>Department</td><td>AGRICULTURAL AND FOREST SCIENCES AND ENGINEERING</td></tr>
<tr><td>Important information on data processing</td><td>Consult this link for more information.</td></tr>
<tr><td>Language</td><td>English</td></tr>
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ST IN MULTI-SCALE FOREST DYNAMICS MODELS 2023-24

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
AMEZTEGUI GONZALEZ, AITOR	aitor.ameztegui@udl.cat	2	
MARTÍN GÓMEZ, PAULA	paula.martin@pvcf.udl.cat	3	

Learning objectives

The course aims at introducing the students into the main approaches used to simulate forest dynamics at several spatial scales. It will provide some general modeling principles and information on the main trends in modeling forest dynamics in Europe. At the end of the course, the students will know: (1) the advantages and disadvantages of the different forest modeling approaches, (2) the main applications of some of the most widespread models of forest dynamics used in Europe and (3) how to use them.

Competences

After taking this course, the students will have learned:

- The principles that must underlie in any model of forest dynamics
- The applications of models of forest dynamics, and the current trends in forest modelling in Europe.
- The main types of models, their advantages and limitations
- How to use forest models to solve forestry and ecology problems

How to use, in a practical way, some of the most widespread models of forest dynamics

Subject contents

1. Introduction. Principles of modelling of forest dynamics. Types of models according to their functioning or scale. Current trends and needs in modelling forest dynamics.
2. Growth and yield models. Principles, examples and applications.
3. Process-based models: 3-PG, GOTILWA, medfate
4. Individual-based/gap models: JABOWA, FORET, ForClim, SORTIE-ND
5. Landscape models: LandClim, medfire, Landis Pro.
6. Fire spread models: Behave, farsite, FlamMap
7. Regional models: species distribution models

Methodology

Each of the units of the course will contain:

1. Lectures covering the history, conception and development of the covered modeling approach, as well as introduction to some of the main models within that category
2. Readings about the application, usability, limitations and future developments of the covered modeling approach. Readings will be discussed later in class, and in some cases students will have to present a brief reading report.
3. Conferences by some of the developers of the presented models.
4. Practical exercises using some of the models.

At the end of the course, the students will have to present a model of their choice which has not been covered in class. Based on the fromat used during the lectures, they will have to present the model to their colleagues, specify their scope and working scale, discuss the main uses and limitations and, if possible, provide some practical examples of model use. This presentation will be evaluated as part of the grades.

Development plan

Scheduling is by agreement with the students at the beginning of the course.

Evaluation

Grading will be based on (i) completion of practical exercises; (ii) final presentation of a new model, and (iii) participation on lectures and debates.

Component	Weight
Resolution of practical exercises	55 %
Final project: presentation of the model	25 %
Participation in journal clubs and in-class discussions, reading reports	20 %

Bibliography

(Additional literature will be supplied during the course)

- Bugmann, H 2001. A review of forest gap models. Climatic Change 51(3-4): 259-305.
- Kimmins, H; Blanco, JA; Seely, B; Welham, C; Scoullar, K. 2010. Forecasting Forest Futures: A Hybrid Modelling Approach to the Assessment of Sustainability of Forest Ecosystems and their Values. The Earthscan Forest Library. Vancouver, Canada.
- Larocque, GR; Shugart, HH, Xi, Weimin; Holm, JA. 2015. Forest succession models. In: Larocque, G (ed) Ecological Forest Management Handbook. CRC Press. Ottawa, Canada.
- Larocque, GR; Komarov, A; Chertov, O; Shanin V; Liu, J; Bhatti, JS; Wang, W; Oeng, C; Shugart HH; Xi, W; Holm JA. 2015. Process-based models, a synthesis of models and applications to address environmental and management issues. In: Larocque, G (ed) Ecological Forest Management Handbook. CRC Press. Ottawa, Canada.
- Schneider, R; Franceschini, T; Fortin, M; Martin-Ducup, O; Gauthray-Guyénet, V; Larocque, GR; Marshall, P; Bérubé-Deschênes, A. 2015. Growth and Yield models for predicting tree and stand productivity. In: Larocque, G (ed) Ecological Forest Management Handbook. CRC Press. Ottawa, Canada.
- Taylor, A.R., Chen, H.Y.H., VanDamme, L., 2009. A review of forest succession models and their suitability for forest management planning. Forest Science 55, 23–36.