

**Proyecto docente de la asignatura**

<b>Asignatura</b>	FOREST PEST AND DISESASES		
<b>Materia</b>			
<b>Módulo</b>	Optional, Block I		
<b>Titulación</b>	<i>Forest Management based on Data Science</i>		
<b>Plan</b>	428	<b>Código</b>	<b>3-309-506-53028-1-2015</b>
<b>Periodo de impartición</b>	1 <sup>st</sup> semester (2 <sup>nd</sup> Period)	<b>Tipo/Carácter</b>	OP
<b>Nivel/Ciclo</b>	MASTER	<b>Curso</b>	2º
<b>Créditos ECTS</b>	6		
<b>Lengua en que se imparte</b>	English		
<b>Profesor/es responsable/s</b>	Julio Javier Diez Casero Jorge Martín García Mercedes Fernández Fernández Fernando Alves Santos		
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<b>Horario de tutorías</b>	<a href="http://www.uva.es/export/sites/uva/2.docencia/2.02.mastersoficiales/2.02.01.ofertaeducativa/2.02.01.01.alfabetica/Mediterranean-Forestry-and-Natural-Resources-Management-Medfor-Erasmus-Mundus/">http://www.uva.es/export/sites/uva/2.docencia/2.02.mastersoficiales/2.02.01.ofertaeducativa/2.02.01.01.alfabetica/Mediterranean-Forestry-and-Natural-Resources-Management-Medfor-Erasmus-Mundus/</a> <a href="https://pod.uva.es/pod/redireccionTutorias.do">https://pod.uva.es/pod/redireccionTutorias.do</a>		
<b>Departamento</b>	Producción Vegetal y Recursos Forestales/Ciencias Agroforestales		

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## 1. Situación / Sentido de la Asignatura

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### 1.1 Contextualización

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Insect pests, diseases and other biotic agents have considerable impacts on forests and the forest sector. They can adversely affect tree growth and the yield of wood and non-wood products. Damage caused by forest pests can significantly reduce wildlife habitat thereby reducing local biodiversity and species richness. They can alter natural forest landscapes by decimating one or more tree species as has been observed in eastern American forests as a result of chestnut blight and throughout the Northern Hemisphere because of Dutch elm disease. Some pests have necessitated changes in management regimes often forcing forest managers to switch to alternative tree species in plantations; for example, the failed attempts in many parts of the world to establish mahogany plantations because of the presence of mahogany shoot borers (*Hypsipyla* spp.). Pathogens may also limit the sites on which species can be grown successfully outside their natural range as has been experienced with red band needle blight (*Mycosphaerella pini*) and western gall rust (*Endocronartium harknessii*) infecting *Pinus radiata*.

Global change (climatic change, transcontinental commerce, changes in land use) has exacerbated some of the already known problems caused by native pests and diseases, while at the same time it has fuelled the occurrence of other new, potentially more threatening, due to the invasion of alien forest organisms. Management of these problems requires the understanding and international cooperation on the state of global forest health, and the use and dissemination of accurate and timely information. Such information is nowadays being made available in several Data bases, whether regional, national, or worldwide, which must be known, used and mined, as a key support for diagnostic and scientifically sound decision making in forest health management.

### 1.2 Relación con otras materias

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The course on Forest Pests and Diseases is basically related to other in the optional module that focus on data bases general management, as *Bases de datos relacionales y SQL* y *Fundamentos de programación con Python*, and particularly to *Cambio global y bosque*, where several issues related to the introduction of alien invasive species are dealt to. Within the optional module, the action of forest pest and diseases is linked to other courses dealing with the processes that occur in forest communities, such as *Conservación de Flora y Fauna y Dinámica de sistemas forestales*. Besides, they are also related the group of tools highly valuable in monitoring and damage evaluation caused by such organisms, being object of the courses *Geographical Information Systems and Geospatial analysis* and *Teledetección forestal*.

### 1.3 Prerrequisitos

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None

## **2. Competencias**

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### **2.1 Generales**

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- G1 Knowledge of the basic elements of professional work in practical form, analysing and synthesizing relevant data and organizing and planning teams and processes
- G2 Ability of communicate in spoken and written forms, either in specialized forums or with non expert people.
- G3 Knowledge, abilities and skills on computer and on technologies of information and communications (TIC)
- G4 Ability of team and individual working, within a local, regional, national and international framework.
- G5 Ability of taking initiatives and developing entrepreneur skills

### **2.2 Específicas**

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- E8 Ability to quantify and understand the effects of several impacts in forest systems.
- E11 Ability to look for, select, generate and manage suitable data bases to obtain relevant information of forest management problems.

### **3. Objetivos**

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To know the strategies, tactics and scientific and research advanced methods for the diagnostic and management of forest pests and diseases. Remove, mine, manage, analyze and discuss the relevant information contained in nacional and International data bases.

Main concepts related to the diagnostic, defense and resistance mechanisms of conifers against insects vectors and their associated fungi.

#### 4. Tabla de dedicación del estudiante a la asignatura

<b>ACTIVIDADES PRESENCIALES</b>	<b>HORAS</b>	<b>ACTIVIDADES NO PRESENCIALES</b>	<b>HORAS</b>
Theoretical classes	30	Autonomous learning and documentation	45
Practical classes (classroom)	10	Elaboration and preparation of individual reports	25
Practical classes (Laboratory and field)	20	Collaborative and group learning	20
Collaborative and group activities		Forum , virtual debate, self evaluation ,	
Seminars			
Evaluations			
<b>Total presencial</b>	<b>60</b>	<b>Total no presencial</b>	<b>90</b>

## 5. Bloques temáticos

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### Bloque 1:

Forest Pests and Diseases

Carga de trabajo en créditos ECTS:

#### a. Contextualización y justificación

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Described in 1.1

#### b. Objetivos de aprendizaje

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Described in 3

#### c. Contenidos

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1. Diagnosis of Forest Pest and Diseases:
  - a. Visual Diagnostic
  - b. Diagnostic by the use of Microscopy.
  - c. Molecular Diagnostic.
  - d. NCBI: GeneBank
  - e. Introduction to BLAST and their use to diagnostic of organisms.
  - f. Bioinformatics analysis of sequencing data using MG-RAST, and Galaxy bioinformatics tools.
2. Forest pest dynamics and population patterns.
3. Forest pests management. Monitoring. Silvicultural methods. Use of semiochemicals. Biological control strategies.
4. Main concepts related to conifer defense mechanisms against insects (borers and gall inducing insects).
5. Symbiotic associations of bark beetles and fungi: biodiversity and ecology.
6. Data bases for forest pest and diseases management. European network for forest damage. International advisory organizations. Invasive forest pests and diseases. Quarantine organisms.

#### d. Métodos docentes

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- . Presentation in the classroom of concepts, contents, and practical cases
- . Group discussion in the classroom
- . Practical work on data bases and web sites in classroom
- . Seminars on current forest health problems by forest pest managers
- . Field trip visits to forest health canter and forest health experiences
- . Preparation on a written report

#### **Métodos docentes adaptados a la docencia virtual** (en el caso de tener que ofrecerse esta opción por motivos sanitarios)

- . Synchronous theoretical lectures with student participation.
- . Synchronous practical classes for the recognition of mites and bark beetles as well as the fungi they carry.

## Proyecto docente de la asignatura

. Explanation to carry out individual student work on bioecology and damage to insect species that are disease vectors.

### **e. Plan de trabajo**

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Presential:

Attendance and discussion of concepts, contents and cases in the classroom: 45 hours.

Attendance and participation on seminars: 5 hours

Attendance, participation and discussion on issues during external visits and field trips: 10 hours

Non Presential:

Personnel study of material and bibliographic references provided: 50 hours

Research on websites and data bases, preparation of individual report: 40 hours

#### **Plan de trabajo online** (en el caso de tener que ofrecerse esta opción por motivos sanitarios)

Teaching of synchronous theoretical lectures with student participation.

Teaching of synchronous practical classes for the recognition of mites and bark beetles as well as the fungi they carry.

Teaching of the norms for the accomplishment of the individual work of the student on bioecology and damages of species of insects vectors of diseases.

### **f. Evaluación**

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Evaluation will be based on the one hand the active participation (questioning, discussion, debate) in presential activities in the classroom, seminars and field trips (40%). On the other hand, qualification will be completed by individual report prepared by the students on assigned study cases (35 %). In the report, quality and suitability of contents and formal aspects of the report (editing, graphical information) will be valued. Furthermore, the student will be scored by a specific knowledge test (25%) about the main topics of the subject.

#### **Evaluación online** (en el caso de tener que ofrecerse esta opción por motivos sanitarios)

- 60% of the mark: theoretical and practical exam
  - 20% of the mark: participation in virtual classes
  - 20%: delivery of an individual work of the student
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### **g. Bibliografía básica**

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- Baker, K., Cook, R. J. 1983. Biological control of plant pathogens. 433pp. APS Press. 0-7167-0589-3.
- Bourtzis, K.; Millar, T.A. 2003. Insect symbiosis. Contemporary topics in Entomology series. CRC Press.
- Ciesla W.M. 2011. *Forest Entomology. A Global perspective*. Wiley-Blackwell. Oxford.
- Claverie, J. M.; Notredame, C. 2011. *Bioinformatic for Dummies*. John Willey and Sons. 454 p.
- Cynthia Gibas, Per Jambeck 2001. *Developing Bioinformatics Computer Skills*. "O'Reilly Media, Inc." 2001 - 427 p.
- De Bach P., Rosen D. (1991). *Biological control by natural enemies*. 2<sup>nd</sup> ed. Cambridge.
- FAO (2009). *Global Review of Forest Pests and Diseases*. Communication División FAO. Rome. 15 pp.
- Fernández, M.M.; García, A.E., Lieutier, F., 2004. Effects of various densities of *Ophiostoma ips* inoculations on *Pinus sylvestris* in north-western Spain. *For. Path.*, 34:213-223.
- Gil L., Solla A., Iglesias S (eds). (2003). *Los olmos Ibéricos. Conservación y mejora frente a la grafiosis*. M° de Medio Ambiente. Madrid.
- Kostas, B.; Miller, T.A.,(Eds.) 2003. *Insect symbiosis*. CRC Press.
- Lieutier, L.; Day, K.R., Battisti, A., Grégoire, J.C., Evans, H.F. (2004): *Bark and wood boring insects in living trees in Europe, a synthesis*. Kluwer Academic Press.
- Mackauer M., Ehler L.E., Roland J. (eds) (1990). *Critical issues in biological control*. Intercept.
- Mount, B. W. 2004. *Bioinformatics: Sequence and Genome Analysis*. CSHL Press. 692 p.
- Paine, T., Lieutier, F. 2016. *Insects and diseases of Mediterranean forests systems*. Springer.
- Pérez, G.; Díez J.J.; Ibeas, F.; Pajares, J.A. (2008). Modelling Pine Wilt Disease Risk under a climate change scenario in North Western Spain. 269-282. En: *Managing forest ecosystems: the challenge of climate change* (Bravo F., LeMay V. and V Gadow K, eds.) Kluger Academic Publishers.
- Schowalter, T.D., Filiip, G.M. (eds.) (1993). *Beetle-pathogen interactions in conifer forests*. Academic Press.
- Vega, D., Hofstetter, R., 2015. *Bark beetles. Biology and ecology of native and invasive species*. Academic Press.
- Wagner, M.R. et col., 2002. *Mechanisms and deployment of resistance in trees to insects*. Kluwer Academic Publishers.
- Wainhouse D. 2005. *Ecological methods in forest pest management*. Oxford University Press.
- Wingfield, M.J.; Seifert, K.A., Webber, J.F., 1999. *Ceratocystis and Ophiostoma*. Taxonomy, Ecology and Pathogenecity. APS Press.
- Zhao B.G., Futai K., Sutherland J.R. y Takeuchi (eds). 2009. *Pine wilt Disease*. Springer. Berlín.

#### **h. Bibliografía complementaria**

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<http://metagenomics.anl.gov/>

<https://blast.ncbi.nlm.nih.gov/Blast.cgi>

<https://usegalaxy.org/>

[www.cabi.org](http://www.cabi.org) Commonwealth Agricultural Bureaux International CABI

[www.eppo.org](http://www.eppo.org) Organización Europea y Mediterránea de Protección a los Vegetales

[www.forestpests.org](http://www.forestpests.org) Forest Pest and Diseases

[www.fs.fed.us/foresthealth](http://www.fs.fed.us/foresthealth) Forest Plant Health

[www.icp-forests.org](http://www.icp-forests.org) Estado de los Bosques en Europa

[www.iefc.net](http://www.iefc.net) Institute Européen de la Fôret Cultivée

[www.iobc-wprs.org](http://www.iobc-wprs.org) Organización Internacional de Lucha Biológica (OILB- IOBC/WPRS)

[www.ippc.int](http://www.ippc.int) Convención Internacional de Protección a los Vegetales

[www.iufro.org](http://www.iufro.org) International Union of Forest Research Organizations

[www.mma.es/secciones/biodiversidad/montes\\_politica\\_forestal/redes\\_europeas\\_bosque/estado\\_bosques\\_europa.htm](http://www.mma.es/secciones/biodiversidad/montes_politica_forestal/redes_europeas_bosque/estado_bosques_europa.htm) Ministerio de Medio Ambiente, y Medio Rural y Marino. Informe sobre el Estado de los Bosques

[www.ncbi.nlm.nih.gov/genbank/](http://www.ncbi.nlm.nih.gov/genbank/)

#### **i. Recursos necesarios**

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- . Virtual Campus
- . Classroom with audiovisuals (digital board, projector)
- . Computer rooms
- . Forest health laboratories
- . Forest sites containing forest health experiences and cases
- . Forest health facilities in the Autonomous Community
- . Tutorial support during the course within the assigned timetable

#### **6. Temporalización (por bloques temáticos)**

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BLOQUE TEMÁTICO	CARGA ECTS	PERIODO PREVISTO DE DESARROLLO
Forest Pests and Diseases	6	November-December 2016

#### **7. Sistema de calificaciones – Tabla resumen**

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INSTRUMENTO/PROCEDIMIENTO	PESO EN LA NOTA FINAL	OBSERVACIONES
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## Proyecto docente de la asignatura

Participation in lectures, practical activities, seminars and field trips	40%	
Individual Report	35%	Written and oral presentation
Specific knowledge test	25	

### 8. Consideraciones finales

*Those students that did not pass and require a 2<sup>nd</sup> chance, will be asked to fulfill the same requisites as in the first evaluation.*

More information is offered on the webpage of the Sustainable Management Research Institute: <http://sostenible.palencia.uva.es/gfs/formacion/maestrias/7/default.aspx>