



# **A Curriculum Proposal for Forestry Engineering Studies at Degree Level According to USAEE Guidelines**

USAEE: University Studies of Agricultural Engineering in Europe (Thematic Network)



# Presentation structure

- Introduction
- New Challenges for Spanish Universities: Legal framework
- Spanish engineering studies and the problematic adaptation to EHEA
- Basis for a Curriculum Proposal for Forestry Engineering and Natural Environment Management
- A Curricular proposal



# Introduction

- Bologna (1999) process: an opportunity to reorganize university studies programmes in AgroForestry and Natural Environment Engineering.
- Ministers in Bergen (2005) adopted the overarching framework for qualifications in the EHEA: three cycles, generic descriptors for each one, and credit ranges in the first and second cycles (EQF).



# Introduction

- Legislation regarding EHEA in Spain:
  - European Diploma Supplement in 11/09/2003
  - European Credit Transfer System in 18/9/2003
  - Real Decreto 1393/2007 of 29 October 2007
- Focus on definition and justification of knowledge and skills needed for the training of professionals in Engineering Forestry and Natural Environments.



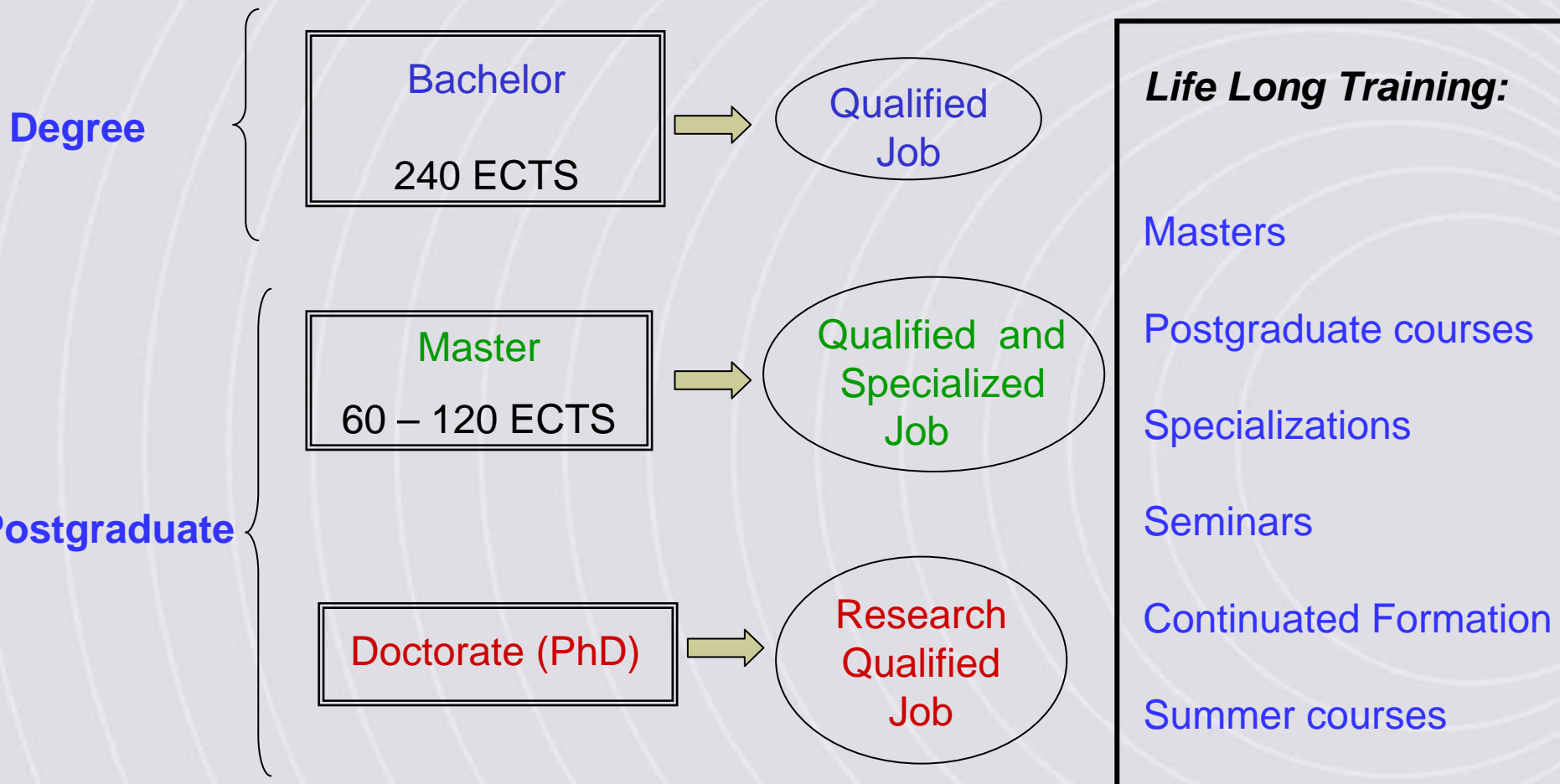
# New Challenges for Spanish Universities

- **Spanish regulation proposes:**
  - Main goal for Degrees the general education of the students, in one or more disciplines, aimed at preparing them for the performance of activities of a professional nature
  - **Basis for developing university curricula:**
    - Fulfilment of the objectives measured in ECTS.
    - Level of learnings expressed in numerical scores.
    - Include a list of the minimum competences and skills to be reached with learning objectives



# New Challenges for Spanish Universities

## Spanish adaptation of University education to EHEA





# New Challenges for Spanish Universities

- Engineering and architecture programmes should contain a minimum of 60 credits of basic training, at least 36 will be linked to some of the following core subjects (troncales):
  - Graphic expression
  - Physics
  - Computers applications
  - Mathematics
  - Chemistry
  - Management





# Spanish engineering studies

## First level

- “Ingeniero Técnico” or “Arquitecto Técnico”
- 3 years

## Second level

- “Ingeniero” or “Arquitecto”
- 5 years
- 6 years in some cases (forest & civil engineer)





# Adaptation to EHEA Spanish engineering studies

- Core subjects for the studies of Forestry and Natural Environment Engineer :
  - Curricula guidelines from ANECA work
  - The guidelines from the thematic network Studies of Agricultural Engineering in Europe (USAEE, 2006)
  - Ibero-American Association of Institutes of Engineering Education (ASIBEI, 2005)



# Basis for a Curriculum Proposal

## USAEE Proposal (Table 1)

<i>Subject Groups</i>	<i>Credits</i>	<i>Rates</i>
Basic subjects	36-45	20-25 %
Basic Engineering Sciences	72-81	40-45 %
Basic AgroForestry Sciences	36-45	20-25 %
Optional subjects	18-27	10-15 %
Total	180	100 %



# Basis for a Curriculum Proposal

## ASIBEI Proposal (Table 2)

<i>Subject Groups</i>	<i>Rates</i>	<i>Average rates</i>
Basic subjects	17-35	24 %
Basic Engineering Sciences	15-38	27 %
Basic AgroForestry Sciences	15-55	29 %
Optional subjects	0-20	11 %
Total	100%	



# Basis for a Curriculum Proposal

## Authors Proposal (Table 3)

<i>Subject Groups</i>	<i>Credits</i>	<i>Rates</i>
Basic subjects	48	26.7 %
Basic Engineering Sciences	74	41.1 %
Basic AgroForestry Sciences	45	25 %
Optional subjects	13	7.2 %
Total	180	100 %



# Curriculum Proposal

## First course (Table 4)

Courses units	ECTS	Subject	Subject Groups
Calculus	6	Mathematics	Basic
Algebra	6	Mathematics	Basic
Physics	6	Physics	Basic
Chemistry	6	Chemistry	Basic
Computer applications	6	Informatics (Computer ap.)	Basic
Graphic expression in engineering	6	Technical	Basic Engineering Sciences
Management	6	Legal and social sciences	Basic Engineering Sciences
Thermodynamics	5	Technical	Basic Engineering Sciences
Statics	5	Technical	Basic Engineering Sciences
Optional (at least 2)	8	Legal and social sciences	Basic
TOTAL	60		



# Curriculum Proposal

## Second course (Table 5)

<b>Courses units</b>	<b>ECTS</b>	<b>Subject</b>	<b>Subject Groups</b>
Advanced calculus	5	Mathematics	Basic
Statistics	5	Mathematics	Basic
Dynamics	5	Technical	Basic Engineering Sciences
Fluid mechanics	5	Technical	Basic Engineering Sciences
Thermotechnics	5	Technical	Basic Engineering Sciences
Electricity and electronics	5	Technical	Basic Engineering Sciences
Edaphology	5	Sciences	Basic AgroForestry Sciences
Meteorology and climatology	5	Sciences	Basic AgroForestry Sciences
Optionals (at least 2)	10	Technical	Basic Engineering Sciences
Optionals	5	Legal and social sciences	Basic
Optional	5	Sciences	Basic AgroForestry Sciences
TOTAL	60		



# Curriculum Proposal

## Third course (Table 6)

Courses units	ECTS	Subject	Subject Groups
Operation research	4	Mathematics	Basic
Dynamical systems	4	Technical	Basic Engineering Sciences
Plant biology	5	Sciences	Basic AgroForestry Sciences
Animal biology	5	Sciences	Basic AgroForestry Sciences
Biochemistry	4	Chemistry	Basic
Ecology	5	Sciences	Basic AgroForestry Sciences
Optionals (at least 2)	18	Technical	Basic Engineering Sciences
Optionals (at least 2)	15	Sciences	Basic AgroForestry Sciences
TOTAL	60		





# Curriculum Proposal

## Fourth course (Table 7)

Courses units	ECTS	Subject	Subject Groups
Greenhouses and nurseries	5	Sciences	Basic AgroForestry Sciences
Parks, gardens and urban trees	5	Sciences	Basic AgroForestry Sciences
Landscape ecology	5	Sciences	Basic AgroForestry Sciences
Projects	4	Technical	Basic Engineering Sciences
Land planning	4	Technical	Basic Engineering Sciences
Marketing Analysis	4	Technical	Basic Engineering Sciences
Optionals	12	Technical	Basic Engineering Sciences
Optionals	8	Sciences	Basic AgroForestry Sciences
Final-year project	13	After to pass the total of programme subjects	
TOTAL	60		



# Curriculum Proposal

<b>Table 8</b>	<b>Forest production</b>	<b>Forest industry</b>
<p><b>Basic Engineering Sciences (28 ECTS)</b></p>	<ul style="list-style-type: none"><li>■ <b>General technology of forest products</b></li><li>■ <b>Surveying and GIS</b></li><li>■ <b>Remote sensing</b></li><li>■ <b>Forest harvesting and Transport</b></li><li>■ <b>Forest machinery</b></li><li>■ <b>Forest road design</b></li><li>■ <b>Hydrology</b></li><li>■ <b>Irrigation systems</b></li><li>■ <b>Precision forestry technology</b></li></ul>	<ul style="list-style-type: none"><li>■ <b>Physics of the wood.</b></li><li>■ <b>General and industrial technology.</b></li><li>■ <b>Surveying and GIS.</b></li><li>■ <b>Forest harvesting and transport</b></li><li>■ <b>Forest and industrial machinery</b></li><li>■ <b>Forest road design</b></li><li>■ <b>Instrumental analysis.</b></li><li>■ <b>Chemistry of non-woody forest products.</b></li><li>■ <b>Technology non-woody forest products</b></li><li>■ <b>Timber technology</b></li><li>■ <b>Timber structures</b></li><li>■ <b>Quality control</b></li></ul>



# Curriculum Proposal

<b>Table 8</b>	<b>Forest production</b>	<b>Forest industry</b>
<p><b>Basic AgroForestry Sciences (20 ECTS)</b></p>	<ul style="list-style-type: none"><li>■ Trees measurement</li><li>■ Silviculture</li><li>■ Reforestation</li><li>■ Forest management and assessment</li><li>■ Forest diseases and pests</li><li>■ Forest fire-fighting</li><li>■ Game management</li><li>■ Forest genetics</li><li>■ Acuiculture</li><li>■ Grazing</li></ul>	<ul style="list-style-type: none"><li>■ Environmental impact assessment</li><li>■ Forest diseases and pests</li><li>■ Waste management</li><li>■ Environmental management</li><li>■ Silviculture and reforestation</li><li>■ Forest management and assessment</li><li>■ Timber treatments</li><li>■ Drinking water and wastewater</li><li>■ Sanitary engineering</li><li>■ Industries of cork bark, resins and essential oil</li></ul>



# Curriculum Proposal

**And finally....**

**If somebody want to give one's opinion**

**Please sign**

- **The most important subjects**
- **ECTS necessary for all of them**



## Questions for Authors

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