

Postgraduate Studies in Biosystems Engineering to acquire a Doctor degree in Spain

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Introduction

What is Biosystems Engineering (BE)?.

...science based in engineering and the physical sciences that reflects the wide range and the interdisciplinary nature for understanding or modelling the performance of biological systems for sustainable developments in land use and the environment, agriculture and amenity, bio-production processes and the food chain...

University Studies of Agricultural Engineering in Europe (USAEE) & Education and Research in Biosystems Engineering in Europe (ERABEE) Thematic Networks.

Introduction

Doctoral programs

- **2478** different doctoral programs are offered in 69 Spanish Universities.
- **189** programs are related to the topic of Biosystems Engineering.
- **58%** of the titles on this topic are not verified by the Spanish National Agency for Quality Assessment and Accreditation (ANECA)
- **42%** have been verified and adapted to the European Higher Education Area (EHEA).

Objective

- To analyze the overall situation of the third cycle university degrees in Spain and other European countries.

Postgraduate Studies in Spain and Europe

- ECTS (European Credit Transfer and Accumulation System). Some European countries have not incorporated this system in the doctorate studies yet (e.g. Germany or the Czech Republic).
- Some of the European countries have national regulations on postgraduate studies and others have regulations provided internally in each University (e.g. Flanders, Finland or Germany).
- Doctoral Schools.

Postgraduate Studies in Spain and Europe

In Spain:

- Since 2003, Spain is enacting legislation to fulfill with the EHEA
 - RD 1044/2003: European Diploma Supplement
 - RD 1125/2003: European Credit Transfer System
 - RD 1393/2007: Organization of the official education according to the European Commission guidelines.
- ANECA (www.aneca.es) . Certification and accreditation of University degrees and Doctoral programs.
- Duration: 3-4 years to complete the doctorate.
- Requirements: 2nd cycle studies, Master's degree or 300 ECTS
- Entry: Selection of the best students, personal contacts, advertisement. Scholarships offered by the State on a competitive basis, research projects or companies.

Postgraduate Studies in Spain and Europe

Country	Third cycle years	Compulsory Courses (ECTS)	Optional Courses (ECTS)	Training Activities	Publications
Spain	2-5	Yes	Yes (60-120 considering compulsory and optional)	Research activities	Not required
Flanders (Belgium)	4	Attend one seminar	No	-Deliver two seminars -Teaching activities	At least one paper and active participation in an international conference
Bulgaria	3-4	-Structured program Individual Training -Free Ph.D. Studies (<20)	Yes (< 24)		At least 75 % of the work should be published before defending the thesis
Denmark	3	Yes (30)		210-840 hours of teaching	
Finland	3-5	Yes (>15)	Yes (>45)		Article based thesis. Typically 4 articles
France	3	Yes (20-30 Hours per year)			1 scientific paper 2-3 international conference papers
Germany	3-6	No	No		1 peer-reviewed paper

Postgraduate Studies in Spain and Europe

Country	Third cycle years	Compulsory Courses (ECTS)	Optional Courses (ECTS)	Training Activities	Publications
Greece	3-5	Yes (Depending on the candidate)			Part of the thesis published or accepted for publication in a journal or conference
Ireland	3	No	No	Normally one year of teaching and educational training	Research based on papers or a written thesis
Italy	>3	Yes (No)	Yes (No)		Not required
Portugal	3	Yes (<30)			Research based on papers or a written thesis
Slovakia	3-5	Yes (60)		Research activities	Publications are assigned with ECTS accordingly with a table. A minimum is required (120 ECTS)
Sweden	> 4	Yes (45)	Yes (15-45)	Research activities	Thesis based on 3 to 5 scientific papers or a monograph
United Kingdom	3 full time Pro-rate part time	No	Yes	Seminars	Strongly encouraged to deliver a paper to an international conference

Postgraduate Studies in Spain and Europe

Country	Kind of thesis	Supervisor	Number of members of the board	Foreign members	Opponents	Supervisor in the board	Preliminary defence
Spain	Monograph. Article based possible	Researcher	5 (At least 3 must be external)	Possible	No	No	Yes (3 reviewers)
Flanders (Belgium)	Monograph	(Professors, lecturers or doctorates with 3 years experience) Two assessors	6-7	Recommended	No	Yes	Yes
Denmark	Monograph	2-3 supervisors, being the main the leader of the project	Evaluation committee		Yes		
Finland	Article based or monograph		4-5	Usually	Yes	No	Yes
France	Monograph	Full professor	5-8		No	No	No
Germany	Monograph		5		No	No	No

Postgraduate Studies in Spain and Europe

Country	Kind of thesis	Supervisor	Number of members of the board	Foreign members	Opponents	Supervis or in the board	Preliminary defence
Greece	Monograph	Full or associate or assistant professor	7 (3 of them full professors of the university)	Possible	No	No	No
Ireland	Article based or monograph	One or several supervisors and advisors	3-4	Usually	No	No	No
Italy	Monograph	Professor or full researcher	3 (2 of them external)	Possible	No	No	No
Portugal	Article based or monograph	Generally a professor	7-9 (Half external)	At least one	No	No	No
Slovakia	Monograph	Approved by the scientific board of the faculty	5	Possible	No		3 reviewers
Sweden	Article based or monograph	At least two, the main supervisor being professor or associate professor	3 or 5 (1 external)	Usually	Yes	No	No
United Kingdom	Monograph	Two supervisors, the main one with at least two successful THIRD cycle research degrees completed	2		No	No	No

Topics in BE postgraduate studies in Spain and Europe

- BE studies in USA and Canada are found to be at a very advanced stage. However in Europe, very few 3rd cycle studies in BE have been initiated.
- Offer is very extensive in Spain due to doctoral studies ruled by the legislation RD 1393/2007 and the previous RD 778/1998 coexist.

- 189 3rd cycle studies programs contains topics related to BE.

Environmental engineering technology (88)

Food engineering (31)

Agricultural production (20)

Biotechnology (14)

Renewable energy (10)

Forestry production (5)

Management of the rural territory (18)

- 1 Verified Research Master in Biosystems Engineering of the Universidad de León.

Quality, security and environment management

Local varieties of crops in eco-compatible agrarian systems

Numerical methods in engineering

Experimental tests on new materials, recycling of materials, quality of the electric supply

Agri-food industries technology

Geomatic techniques applied to Biosystems Engineering

New technologies applied to the treatment of organic waste products

Biotechnology applied to the agriculture

Minimization of the environmental impact

Genetic resources and genetic technologies

Wood diseases, fungus and mycorrhizas

Analysis of current postgraduate studies in BE and adapted to the EHEA in Spain

- 94.5% of the 189 Spanish PhD degrees in BE are taught at public Universities in Spain, only 5.5% are taught at private ones.

University	PhD	Type
Universidad Politécnica de Cataluña	15	Public
Universidad de Córdoba	10	Public
Universidad Politécnica de Madrid	10	Public
Universidad del País Vasco	9	Public
Universidad de Santiago de Compostela	8	Public
Universidad Politécnica de Cartagena	8	Public
Universidad Politécnica de Valencia	8	Public
Universitat de València (Estudi General)	8	Public
Universidad de Cantabria	7	Public
Universidad de Vigo	6	Public

Fig. 3: Spanish Universities with more than five PhD degrees offered in BE.

Analysis of current postgraduate studies in BE and adapted to the EHEA in Spain

- In Spain, PhD studies in Biosystems Engineering are most frequently offered by Polytechnic Universities.

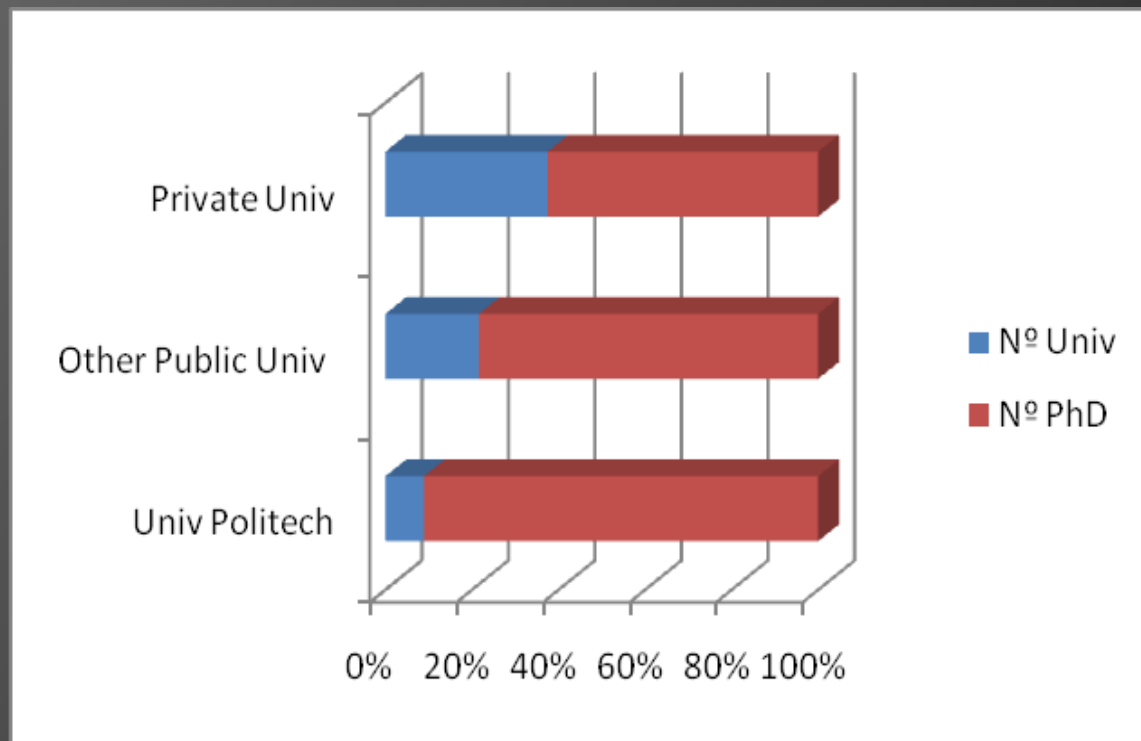


Fig. 4: Percentage of PhD degrees according to the type of University

Analysis of current postgraduate studies in BE and adapted to the EHEA in Spain

- There is not many information available about the assessment of the quality of the PhD programs in BE.
- 50/189 PhD programs are quality recognized by ANECA (26.5%) and 6 more are in progress.
- The Universidad de Extremadura (in 3 of the PhD programs) and the Universidad de Burgos (in 1 of the PhD programs) have in its website some kind of internal systems to assess the quality of the studies and they conduct surveys to the students.
- The Universidad de Valencia (in 2 of the PhD programs) and the Universidad de Castilla La Mancha (in 1 of the PhD programs) have in its website some kind of internal systems to assess the quality of the studies and they do not conduct surveys to the students.

Analysis of current postgraduate studies in BE and adapted to the EHEA in Spain

- The international projection of the PhD studies in BE is very low.
- Only 10 of the Spanish PhD programs in BE are collaborative degrees with non-Spanish Universities.
- Only the University of Pablo de Olavide and the Universidad de Extremadura provide 6 degrees that offer lecturers in English.

University	PhD	Num. Other University
Universidad Politécnica de Madrid	1	6
Universidad Pablo de Olavide	2	4
Universidad Politécnica de Cartagena	2	2
Universidad de Cantabria	1	Unknown
Universidad de Córdoba	1	Unknown
Universidad de Extremadura	2	Unknown
Universidad de Valladolid	1	Unknown

Fig. 5: Number of collaborative PhD degrees with non-Spanish Universities

Analysis of current postgraduate studies in BE and adapted to the EHEA in Spain

- Information about the courses in internet is offered in more than one language in 102 PhD degrees in BE, corresponding to 25 different Universities, 8% offer the information in 4 languages (Universidad Politécnica de Cataluña and Universidad Rey Juan Carlos), 44% offered information in several languages but this information is not available in their website.

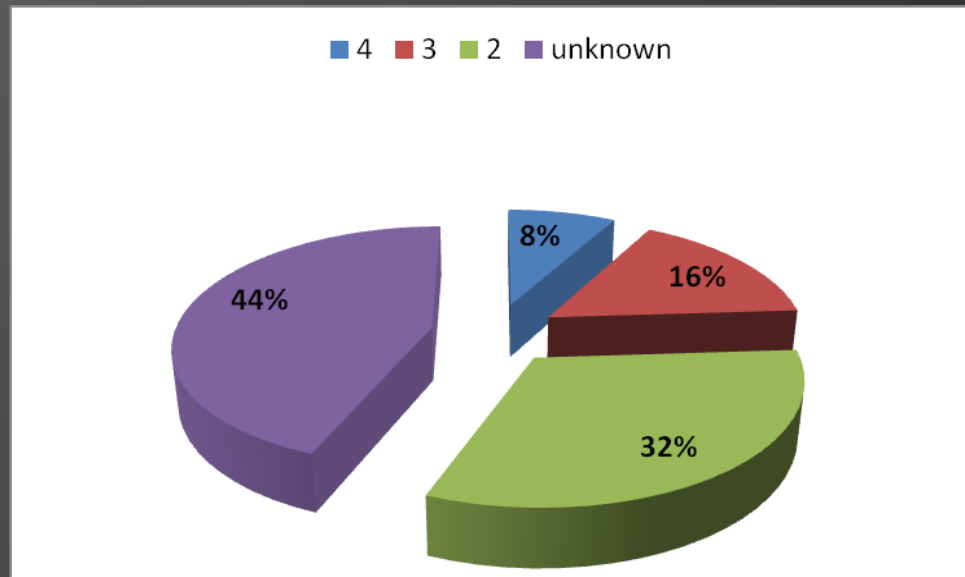


Fig. 6 Universities with information in several languages

Conclusions

- The Doctoral Programs developed under the Bologna Declaration exhibit considerable diversity, not only across different countries in Europe but also across universities within the same country and across faculties and other institutions within the same University.
- The main difficulties to prepare a common international doctorate are due to the low language skills of academics and students, the limited financial support and the differences and rigidity of the internal regulations.
- Some European countries have already initiated third cycle studies programs in Agricultural or BE adapted to the recommendations of the EHEA.

Conclusions

- There will be a trend to increase the offer in PhD degrees for the next years in Spain, although the degrees ruled by the RD 778/1998 will disappear.
- To increase the quality of the PhD programs is a major challenge for the next future.
- Effort must be put in the internationalization of the doctorate studies in Spain. At present there are not many collaborative programs with other European Universities.

THANK YOU