

Presentation of the PhD on Information and Knowledge Society

As a research centre, the IN3 plays home and offers support to the **PhD on the Information and Knowledge Society Programme**, the only PhD offered by the UOC. Offered for the first time in 2000, this programme was one of the first PhDs created in this field of research and, indeed, the first to be offered in its entirety over the internet.

The rise and constant updating of information and communication technologies during the second half of the last century has seen them enter all spheres of human activity: culture, economy, education, media, business management, public services administration and the apparatus of the political system. Analysis of the uses of these technologies in the different spheres and of the profound transformations that accompany them is key for understanding today's society and developing professional activities therein.

The links between the different social, economic, political and cultural systems mean that the traditional disciplinary barriers have to be overcome so as to be able to conduct a thorough and in-depth analysis. Thus, this PhD programme is based on an **interdisciplinary perspective** that involves different theoretical standpoints and different methodological tools.

Specifically, the PhD on the Information and Knowledge Society, designed in line with the directives established by the Royal Decree regulating postgraduate courses (Royal Decree 56/2005, January 21 2005), bases this interdisciplinary perspective on the relationship between the PhD Programme and the Research Groups recognised by the UOC. Consequently, these groups offer a limited **number of places**, be they at a distance or in-house, on their research lines or projects.

These places offer the students that join the conditions needed to carry out academic research that leads to the submission and defence of a PhD thesis on any of the aspects that characterise the Information and Knowledge Society.

Additional information: Homepage of IN3 [<http://in3.uoc.edu>]

PHD Positions Available

The **Software Engineering Research Group (GRES-UOC)** at the Open University of Catalonia offers two PhD positions on the following research topics:

- Development of ontology evaluation methods.
- Development of hybrid algorithms and heuristics based on computer simulation and constraint programming techniques.

Additional information: Homepage of the Research Group [<http://gres.uoc.edu>]

"Development of ontology evaluation methods"

Thesis supervisors: Prof. Jordi Conesa (UOC) and Prof. Vijayan Sugumaran (Oackland University)

Description of the line of research

The growing number of new ontologies available on the Web, and a plethora of existing techniques for creating ontologies has resulted in the need to create tools that facilitate the search and retrieval of ontologies that best match users' requests. These tools have to take into account the quality of ontologies and their suitability to the user's domain and purpose.

Ontology evaluation methods often involve computing scores that focus on linguistic information. To be useful, these methods need to assess the overall quality of an ontology such that it captures all the facets of the ontology being evaluated. Some aspects that are typically not considered are: the amount of factual knowledge (instances) represented in the ontology; the usefulness of the ontology concepts, and the qualitative information an ontology contains (such as the reviews).

Unfortunately, there is no single evaluation method that incorporates all the quality aspects of ontologies. Thus, the main focus of this dissertation is to create an evaluation method that can be used to assess the quality of ontologies according to different facets (linguistic, factual, semantic and qualitative, among others). To do so, a combination of techniques of ontology evaluation and selection must be integrated.

The objectives of this research are to:

1. Assess the scope and depth of available domain ontologies.
2. Define a set of metrics to evaluate ontologies according to different facets.
3. Evaluate the quality of existing popular ontologies using the metrics defined.
4. Provide recommendations for improving quality in future domain ontology development.

Academic profile

This project is directed to Computer Science Engineers. The skills the student will need to complete this project are:

- high abstraction capacity,
- computer programming skills,
- collaborative work skills,
- intermediate or advanced English level, and
- willingness to learn topics not only about computer science but also from other communities (using some cognitive theories that may be needed in this thesis)

"Development of hybrid algorithms and heuristics based on computer simulation and constraint programming techniques"

Thesis supervisors: Prof. Daniel Riera and Prof. Angel A. Juan

Description of the line of research

Computer simulation (CS) is a powerful technique for understanding the behavior of systems (collection of entities which interact over time). In general, to determine whether a system satisfies a property, we have to come up with an abstract model of the system. Given the evolution of this model, we can determine the system properties (e.g. does it reach steady state, is it cyclic, is it feasible, etc.) and evaluate appropriate performance measures (e.g. the steady state values, the cycle period, etc.). Thus, the objective is to develop efficient algorithms to generate evolutions and evaluate properties and performance measures. Typically, we want to describe the input parameters of a model stochastically instead of deterministically. Each set of input parameter values gives rise to a unique evolution. The objective is to obtain performance measures averaged over all such evolutions.

Constraint programming (CP) is a programming paradigm where relations between variables can be stated in the form of constraints. Constraints differ from the common primitives of other programming languages in that they do not specify a step or sequence of steps to execute but rather the properties of a solution to be found; this makes CP a form of declarative

programming. The constraints used in CP are of various kinds: those used in constraint satisfaction problems, those solved by the simplex algorithm, and others. Constraints are usually embedded within a programming language or provided via separate software libraries.

Hybridization of different problem-solving techniques, such as CS and CP, is a promising research field of computer science focusing on synergistic combinations of multiple approaches to develop the next generation of algorithms and heuristics. A fundamental stimulus to the investigations of hybrid algorithms and heuristics is the awareness that combined approaches will be necessary if real-world problems are to be solved. In this context, the candidate will work on the development of hybrid algorithms to solve complex decision and combinatorial optimization problems, with application to several domains.

Academic profile

We are looking for candidates from a Computer Science Engineer / Industrial Engineer / Applied Mathematician (or equivalent) background, with:

The ideal candidate should also have:

- Experience in applied research
- Collaborative work skills

Additional information

- **Related research projects:** Research Program: Plan Nacional de I + D + I (2008-2011), Spanish Ministry of Science and Education "Development of Hybrid Methods and Algorithms to Design Decision Support Systems for the Sustainable Management of Transportation Fleets."
- **More information:** The research project which gives support to this studentship is integrated by two world-class specialists on Computer Simulation and Constraint Programming respectively. These are Professor David Kelton, from the University of Cincinnati, USA, and Professor Mark Wallace, from the Monash University, Australia. Moreover, several specialists from the Computer Science & Operations Research areas are also members of this research project, namely: Dr. Scott Grasman (Missouri University of Science and Technology, USA), Dr. Javier Faulin (Public University of Navarre, Spain), Dr. Ruben Ruiz (Technical University of Valencia, Spain), Dr. Lluís Pla (University of Lleida, Spain), Dr. Juan Ramos (Universitat Autònoma de Barcelona, Spain) and Dr. Pau Fonseca (Technical University of Catalonia, Spain). Therefore, apart from being in contact with specialists from different international universities, the PhD student will be able to complete

a research stage in one of these universities according to his/her preferences and his/her advisors' recommendations.

Related web links:

- [Winter Simulation Conference](#)
- [ASIM Conference on Simulation in Production and Logistics](#)
- [International Conference on Principles and Practice of Constraint Programming](#)
- [Simulation Links & Information](#)
- [Association for Constraint Programming](#)

PRACTICAL INFORMATION

ACCESS REQUIREMENTS

To apply for the PhD on the Information and Knowledge Society, applicants need to meet the following requirements:

- Have an official university masters qualification, or other qualification of the same level, issued by a higher education institution in the EHEA.
- Have passed 60 ECTS credits included in one or more university masters course, in accordance with that offered by the University.
- Have an Advanced Studies Diploma (DEA), obtained in accordance with that established in Royal Decree 778/1998, of April 30.
- Have achieved Research Proficiency, as regulated by Royal Decree 185/1985, of January 23.
- Have an official university degree qualification which, in accordance with the regulations of community law, equates to 300 ECTS credits.
- Graduates of educational systems from outside the EHEA have to have had their foreign higher education qualification recognised as being equivalent to a Spanish university masters qualification.
- Graduates of educational systems from outside the EHEA, do not need to have their qualifications recognised, if they can accredit a level of education equivalent to the corresponding Spanish university masters qualifications and sufficient in the country issuing this qualification to access PhD training.

Meeting any of these conditions does not guarantee admission to the programme, **they are necessary conditions for entry to the selection process for places on the PhD.**

Should none of these conditions be met, **the necessary postgraduate ECTS credits need to be studied in order to meet one of the requirements before applying for admission to the PhD, except when opting for an IN3-UOC grant where the specific requirements for students applying for IN3-UOC grants are applied.**

As well as meeting any of these conditions, a high level of English is also vital for admission to the PhD.

If you do not meet the entry conditions and wish to obtain the necessary ECTS for admission to the PhD programme, you can find further information about the entry requirements for the official master's programme -available only in catalan and spanish- via this link.

GRANTS

The UOC's research institute, the IN3, offers **10 grants for full-time PhDs** that are carried out physically in its headquarters in Castelldefels's Mediterranean Technology Park.

The specific requirements for receiving one of these grants and the application form can be consulted at:

- Call for applications
[http://in3.uoc.edu/index.php/in3web_eng/content/download/17079/1749664/file/Convocatoria_beques_2009_eng.pdf]
- Grant application form
[http://in3.uoc.edu/index.php/in3web_eng/content/download/17080/1749667/file/Formulari_beca_IN3_09_ENG.pdf]

DOCUMENTATION

The formal application for one of the PhD places for the 2009 academic year will be deemed complete when the **application form** has been filled in and sent, and **the following documentation sent in electronic format to ddoctorat@uoc.edu**

- Covering letter in English specifying the reasons for the candidacy and the candidate's research interests (no more than 1,000 words).
- CV in English (with full postal address, contact telephone number and email address) specifying the postgraduate or master's courses taken relating to the research interests expressed in the covering letter.
- Degree and postgraduate academic record (in Catalan, English or Spanish).
- Name, institutional affiliation, postal and email address of three referees.
- A sample of recent academic work (in Catalan, English or Spanish).
- ID or Passport.

The candidates admitted will submit an attested photocopy of the degrees and academic record required for admission to the programme. Failure to submit this documentation or the details therein not corresponding to those stated on the application may lead to candidates not being accepted on the PhD programme.

FEES

Each academic year, the Catalan government sets the public prices for credits and other academic services for the public universities of Catalan and the Universitat Oberta de Catalunya (Open University of Catalonia, UOC). The prices decree for the academic year 2008/2009 has yet to be published. For this reason, the prices of credits and academic services shown below correspond to the academic year 2007/2008.

In accordance with Catalan Regional Government's Decree 151/2007, July 10 2007, which sets the fees for the provision of academic services at public universities for the academic year 2007-2008, the UOC must apply the fees set by the government.

For this academic year, thesis supervision fees for students admitted on the PhD programme within the framework of an official postgraduate programme are set at €98.75.

The Board of Trustees of the Fundació per a la Universitat Oberta de Catalunya sets the fees for connection to the Virtual Campus and the services that the UOC offers PhD students, among other items. For the academic year 2007-2008, these fees are set at €60 per semester.

CALENDAR

- Admission application period: July 17 to September 30 2008.
- Communication of admissions: by October 30 2008.
- Incorporation on the PhD programme: from January 1 2009.