

# Design of a master degree on libre software

## A proposal

### Group for the design of a master degree on libre software

This is a design for a postgraduate master degree on libre software, intended to be implemented within the Bologna framework, in the European Higher Education Space. A prospective curricula, and some implementation scenarios are shown, but in any case all of it is currently open for discussion.

More information: <http://www.nongnu.org/masterlibre/>

## 1. Introduction

Libre software is becoming more and more a ubiquitous reality in the world of computer engineering. During the last years, the world of libre software has increased exponentially (doubling in size, according to almost any parameter, every 18 or 24 months), and the published studies show that this tendency is continuing during the next years. Libre software is present successfully in companies and public administrations, and it is already well known its importance for the current IT (information technology) infrastructure. Therefore, it is clear that a IT engineers will benefit of having deep knowledge of this field, and that education on this topic will be key to guarantee a reasonable amount of professionals well trained and formed in the peculiarities of libre software. However, higher studies programs in this field are almost nonexistent.

This postgraduate program in libre software indeed tries to fill up this formative hollow, for which already a great demand is expected. Its fundamental idea is to complement the knowledge and skills of IT engineers with an in depth exploration of the world of libre software, its peculiarities, and the new possibilities that it is offering. In order to reach these objectives, the program offers on the one hand a basic formation that allows the students to obtain a general vision of the world of libre software from several points of view (computer engineering, economic, legal, etc.). On the other hand, it allows for the choosing of subjects which enter deeply into the most outstanding aspects at every given technological moment, always from a approach designed to take advantage of the special characteristics the world of libre software.

It is also a goal that the students who follow the formation offered by this program can be professionals with deep knowledge of this reality so important in the sector, but so unknown. In addition, their exposition to the practical reality of the more important developments of libre software places them on a specially good position to collaborate in a fast transfer of the peculiarities of these technologies to the IT sector, and in special to the companies that are dedicated to make new developments in it.

## **2. Institutions participating this design study**

This design study has been done in part with the help of a grant by the Regional Government of Madrid, and the institutions (and persons) actively participating in it are the following:

- Universidad Rey Juan Carlos (URJC), <http://www.urjc.es> (Spain). Jesús M. González-Barahona, Gregorio Robles, Vicente Matellán-Olivera
- Universidad Politécnica de Madrid (UPM), <http://www.upm.es> (Spain). Manuel Carro, Joaquín Seoane.
- Universidade do Porto (UP), <http://www.up.pt> (Portugal). Jaime Villate.
- École Nationale Supérieure Électronique, Informatique et Radiocommunications de Bordeaux (ENSEIRB), <http://www.enseirb.fr> (France). François Pellegrini.
- Université Paris Dauphine (Dauphine), <http://www.dauphine.fr/> (France). Jean Michelle Dalle.

## **3. Structure of the master**

This master program is structured in three blocks of 30 credits<sup>1</sup> each (90 credits, or one and a half academic years in total):

- Core modules. Designed to provide a basic common ground for all the
- Specialization modules. Intended to provide specialized education to students, which can chose from a list of optional modules.
- Practicum. Designed to provide students with a real, hands-on knowledge, of some specific aspects of the libre software world.

### **3.1. Core modules**

These modules will provide the students with a deep knowledge of the world of libre software from several viewpoints: software engineering, economy, business, law, etc. In addition, a complete perspective of the libre software landscape (projects, software packages, companies, etc.) will also be shown.

The modules in this group are the following:

- Introduction (4 credits). General background, motivation and introduction to the rest of the core modules.
- Economy and business models (4 credits). Economic models, business cases.
- Legal matters (4 credits). Licensing, legislative initiatives, legal implications.
- Sociology and ethics (4 credits). Motivation for voluntary development, communities, ethics of the libre software movement.
- Development environments and tools (4 credits). Environments and tools common in libre software development.
- Project management (4 credits). Common practices and issues related to libre software project management.
- Case studies (6 credits). Broad and comprehensive study of libre software projects, companies, organizations, etc.

## **3.2. Specialization modules**

This group is composed of an open set of modules, which will change according to the offer made by institutions actually participating in the implementation of the master program each year. Will be enough to allow the students to get specialized knowledge related to some aspects of libre software.

Some possible subjects (all of them devoted to libre software in the referred areas), 3-4 credits each:

- Languages common in libre software projects
- Advanced project development
- Version control and configuration management
- Installation and administration of common libre software platforms
- Security in libre software environments
- Libre software web based systems
- Office tools
- Multimedia
- Mathematic tools
- Database systems
- Embedded systems

## **3.3. Practicum**

The goal of this group of credits is to allow students to have real first hand experience of how libre software actually works in certain aspects. To make it happen, when possible a part of the practicum will

be devoted to participation in real libre software projects, or detailed study of real world aspects related to libre software.

The practicum will be split in two different modules:

- General experiences related to libre software, usually from a multidisciplinary point of view (10 credits).
- Master's thesis (20 credits).

## **4. Implementation scenarios**

Depending on the participant institutions, on the availability of professors, on the target students, and on the acceptance of the program by students, several implementation scenarios could be feasible. Here we present some of them.

### **4.1. One institution scenario**

This scenario is pretty conservative and common: a single University offers the master program. Professors visit that University when participating in classes, and students enroll that University. First academic year could be taught in the traditional way, with the term schedule usual for the implementing University. This first academic year would be split in two terms, the first one for the core modules, the second one for the optional, specializing ones. Then, a third term would be devoted to the practicum.

### **4.2. Intensive and joint scenario**

This is an scenario more focused on actually having a group of European Universities offering jointly the master program. It has into account several limitations which are difficult to avoid in this scenario. First, professors have usually many difficulties in staying every year long periods or time (several months) outside their University. Second, students may have problems if they have to wander through Europe, moving to different Universities in different locations every some months.

To avoid these limitations while trying to maximize the educational impact of the master studies, we propose an schedule based on intensive periods where students and teachers get together in a given location, followed by longer stays, usually at their home University, combined with distance (but locally assisted) learning. The details of this proposal are as follows:

- Each subject will be taught in three periods, two of them in-place, the other as distance learning (and mainly devoted to personal work by the students). For a typical subject of 4 credits, about 30 hours of in-place, classroom teaching (including lectures, practices, etc.) will be provided, in two periods: about 18-24 hours at the beginning of the semester, and about 6-12 hours at the end of the semester.

- Twice a year (summer and winter), students will move to a given location (usually provided by one of the Universities participating in the program) to assist in in-place intensive classes during 4 to 8 weeks. The ending period of a semester will be followed by the starting period of the next one, at the same location, therefore simplifying travels and in general, the logistics of the in-place period.
- The rest of the time students will be at their home Universities, or maybe in stays in other partner Universities (specially during the third semester). During these periods students will complete assigned personal or group projects (using groupware software to interact with other students), will use distance learning tools to complete their knowledge on the subjects, and will also use videoconferencing and recorded sessions to assist to distance lectures and discussions. They will also have local advisors who will help them in their learning process.
- Students will have their semester exams right after the in-place period, when they come back to their home Universities, and when the semester has ended.
- During the in-place period, classes will be performed intensively (about 6-7 hours a day), combining practice classes, lectures, discussions, etc. In general, two subjects will be taught in parallel, one during the morning classes, the other during the afternoon ones.
- Optional subjects will be offered in second and third semesters, giving students the chance to select whichever they want (that is, not overlapping in schedule). With a ratio of about twice the credits offered in optional subjects than the credits that a student has to follow in those subjects, and scheduling half the offer each semester, that will mean that students will have about three-four hours of class a day during the corresponding in-place periods.
- The first part of the practicum will be done during the second semester. The master's thesis during the third semester. During the in-place periods, students will arrange for prospective advisors of their master's work. The third semester will be specially well suited for students to visit other partner Universities, for instance to be close to their advisor on the master's thesis.

## **5. Other implementation details**

### **5.1. Materials used in the master program**

A large part of the materials to be used in the master program will have to be prepared specifically for it, since there are not that many books or other education material on the topics covered by most of its subjects.

In the pure spirit of libre software, we propose that materials developed for an implementation of this master be distributed under libre licenses, which allow for their redistribution and modification. This will for sure simplify for other institutions the adoption of the proposed curricula, but will also help to promote the image of the Universities and professors publishing the first versions of the materials, which will turn easily into reference materials with time.

## **5.2. Lecturers and professors**

Educators participating in implementations of this master program will for sure come mainly from partner institutions. However, it is also important that well known experts participate in the program, sharing their knowledge and experience with the students and all the personnel involved in it. Of course, this will be specially important when dealing with case examples, and with specialized subjects.

## **6. Final comments**

This document is a proposal, discussed among a group of initiators, but open to others willing to contribute. In particular, more implementation scenarios should be addressed, and the curricula should be defined with more detail.

Some institutions are currently considering implementing the design proposed in this document, but the group is still open to participation of new partners.

## **Notes**

1. In this documents, all references to credits are ECTS credits. 60 ECTS credits are, by definition, equivalent to the regular work of a student during one academic year.