

Research Techniques in Network and Information Technologies

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UOC teaching material


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Introduction

"He who has imagination without learning has wings but no feet."

Joseph Joubert, French moralist and essayist.

From a general point of view, research can be defined as the search of knowledge. It is about finding out what humankind does not know yet. Its motivation is clear: nobody knows everything and, sometimes, what is already known is incorrect.

Learning is a fundamental part of research. It provides the background needed to increase knowledge. Each new acquired concept is placed in an upper layer of the already gathered knowledge. Nevertheless, learning is not the end of this process. It is only the beginning. Research is a huge and everlasting job that cannot be conducted by a single person. Thousands of researchers around the world are the engine that generates knowledge and their fuel is the previous knowledge that was generated by others in the past. In addition to that, society can only grow when it is fed with innovation and progress. Accordingly, knowledge must be shared and, hence, disseminating research results is another fundamental part of the whole process. As a result, it can be inferred that the research process follows three essential steps:

- 1) gathering knowledge,
- 2) generating knowledge and
- 3) disseminating knowledge.

As explained above, researchers are the people who conduct this process. They are expected to be methodical, enthusiastic, open minded, curious, hard-working and very imaginative. All these personal skills give them the capabilities to ask themselves the proper questions and find out the proper answers and, hence, produce relevant research results. However, these abilities alone are not enough to fully address the three steps of the research process; researchers who want to be really effective in their work have to be proficient in several other capabilities.

For example, they have to know how to identify the best sources of knowledge. They need to know which tools can help them to generate research results of outstanding quality. They must know how to convey their research results to the general society and, last but not least, they also have to learn how to get funding to advance their research process.

The target of this subject is to introduce all these different capabilities that are also part of the research process to novel researchers. The main idea is to give them the tools and knowledge that they will need in each stage of their research career. This includes relevant points like:

- dealing with intellectual property,
- getting funding for their research,
- conducting quality research and writing, and
- presenting research papers.

Even though the research techniques introduced by this book are not linked to any specific field, they mainly focus on the field of information and networking technologies.

The first module of this material is devoted to **intellectual property (IP)**. This is the property right that derives from the work of an individual's mind or intellect. In the first section, copyright protection is described. The second section introduces trademarks and trade dress. Finally, the last section covers the protection provided by patents.

The second module is devoted to **public funding of research projects (PFRP)**. First, it introduces the resources that can be obtained through a research project and its costs. Then, the standard structure of an application for a research project is presented. Finally, this module introduces some of the funding programmes of the following public institutions:

- Government of Catalonia (Agency for Administration of University and Research Grants),
- Government of Spain (National R+D+I Plan) and
- the European Commission (7th Framework Programme).

The third module covers the **different computer tools** that are available to assist researchers in their activities. These tools help researchers to manage research bibliography, perform quantitative and qualitative data analysis and write and present their research.

The fourth module is devoted to **scientific writing in engineering disciplines** (for example, computer engineering, electronics). The first section describes the types of scientific papers. The following section details the writing of each part of a scientific paper. This module concludes with a section containing some hints on language and style.

The fifth module addresses **how to publish scientific papers**. In the first part of this module, the description of journals and conferences is covered. The second part focuses on the steps for publishing in a journal or presenting a paper in a conference. Finally, some notes regarding how to measure the relevance of a publication are provided.

The sixth and last module explains **how to present research results** in a conference, workshop or in everyday occasions. The first part of the module discusses the presentation itself: it addresses the content of the slides as well as their format. In the second part, the presenter's attitude is analysed.

Objectives

The following competences are developed in this course:

1. Capacity to use the proper tools to protect intellectual property rights.
2. Communication skills to both a specialised and non-specialised audience in a clear and unambiguous way.
3. Capacity to use English as a communication language in the technological field.
4. Capacity to plan, manage, direct and coordinate research projects in the information and communication technology (ICT) field.
5. Capacity to exercise professional activities in accordance with the ethical code and the current legal aspects in the ICT environment and the network society.
6. Capacity to design and carry out research according to rules of scientific knowledge in the field of ICT.

The objectives to be achieved through this course are the following:

1. To understand the importance of using the proper tools to protect intellectual property rights.
2. To understand the structure of a patent and the protection that it offers.
3. To become acquainted with the application structure of a research project and the public funding sources.
4. To become acquainted with the different computer tools which are available to assist in research activities.
5. To understand the structure of a scientific paper.
6. To understand the importance, meaning and writing of each paper section.
7. To understand the steps for publishing in a journal or presenting research results in a conference.

- 8.** To know which information should appear in a presentation.
- 9.** To know some basic techniques for a successful oral presentation.

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Jordi Castellà-Roca

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Jordi Castellà-Roca

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M. Antonia Huertas Sánchez

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Antoni Martínez Ballesté

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Antoni Martínez Ballesté

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Antoni Martínez Ballesté

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