



PROFESSIONAL DEVELOPMENT PROGRAMME FOR RESEARCHERS

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1. PRESENTATION

At any stage of their career, researchers have to ensure that they continually acquire new skills in order to improve their career development prospects. Beyond updating their research competences and knowledge in a specific field, they also need to acquire and improve transferable skills. Universities, as training and working centres for research staff, must therefore offer all researchers, at whatever stage and situation of training and/or contract, the opportunity for continuous training and professional development.

The Universitat Autònoma de Barcelona is well aware of the new scenario and new requirements and, in 2016, it began the process of designing the Professional Development Programme for Researchers. The programme aims to offer support to researchers during their careers, with training sessions that cover their needs at all stages of their professional development. It is aimed at both trainee researchers taking part in one of the more than 60 PhD programmes at the UAB, and those occupying a more stable position in one of the departments and research groups and centres of the UAB.

Since this programme means a change in the conception of researchers training, its implementation must be gradual, beginning with trainee researchers and moving on to the other stages. The first sessions to design the programme took place in the 2016/2017 academic year and defined the model of professional competences for researchers at the UAB. A pilot study with some training sessions aimed at trainee researchers (pre-doctoral researchers) and recognised researchers (PhD researchers who have not yet achieved a significant level of independence in their work) was conducted, and a plan for training in transferable competences for trainee researchers was proposed. In the coming years, it should also include training activities for the other researcher profiles.

A section is included with the regulatory and theoretical background on which the proposal is based, as well as the opinions and concerns of employers, coordinators of PhD programmes and trainee and recognised researchers on which competences are necessary for researchers to acquire during the preparation of their PhD theses.

Below we present the model of professional competences for researchers at the UAB, which is inspired by models applied in other countries or universities (such as the Vitae, a long-term research support model in the United Kingdom), documents produced by the European Union on researchers training and by the regulatory frameworks of national and European calls. These calls require host universities to guarantee training in transferable skills for researchers.

Section four contains the training plan in transferable skills for trainee researchers and includes descriptions of some of the training activities to work on the competences included in the model.

2. BACKGROUND

This section briefly sets out the data and information collected from a review of different documents and the results of the surveys and focus groups held at the UAB to find out the opinions of the PhD programme coordinators, employers and PhD students on researcher competences and their own training.

Both the legislative and theoretical background and the options of the different groups have been taken as references to design the model of professional competences for researchers at the UAB and the training plan in transferable skills for trainee researchers (pre-doctoral researchers) which appear in the third and fourth section of this document respectively.

2.1. Document analysis

Royal Decree 99/2011 of 28 January 2011, which regulates official doctoral programmes, states in article 4 that doctoral programmes must contain both transferable and specific competences.

1. Doctoral programmes must include organised research training aspects that are not required to be structured in ECTS credits and comprise both transferable and specific training in the area of each programme, although in any case the essential activity of the PhD student is research.
2. The organisation of this training and the procedures for controlling it must be stated in the report for the verification of doctoral programmes included in Annex I¹ [...] and must form part of the subsequent assessment for the purpose of renewing the accreditation for these programmes.
3. The training activities carried out by the PhD students will appear in the activities document.

In 2011 the European Union also defined and approved 7 principles for innovative doctoral training², among which is transferable skills training, although a report by the European University Association [EUA] in 2005 had already urged European doctoral programmes to give as much importance to scientific training as to transferable skills training (EUA, 2005, p. 15)³:

- scientific training in core research skills (research methodology and techniques; research management; analysis and diffusion; problem solving; scientific writing and publishing; academic writing in English; awareness of scientific ethics and intellectual property rights; etc.);
- training in transferable (generic) personal and professional skills and competences (writing and communication skills; networking and team-working; material/human resources and financial management; leadership skills; time management; career management including job-seeking techniques; etc.).

¹ Annex I of Royal Decree 99/2011 establishes that the report for the verification of doctoral programmes must include: (a) details of transferable and specific skills training activities in the area of the programme; (b) planning of those activities; (c) control procedures; and (d) mobility actions and criteria.

² European Commission (2011). Principles for Innovative Doctoral Training. Retrieved from http://ec.europa.eu/euraxess/pdf/research_policies/Principles_for_Innovative_Doctoral_Training.pdf (Consulted 03/11/2016)

³ EUA (2005). *Doctoral Programmes for the European Knowledge Society. Report on the EUA Doctoral Programmes Project*. Recuperat de http://www.eua.be/eua/jsp/en/upload/Doctoral_Programmes_Project_Report.1129278878120.pdf (Consulted 03/11/2016)

In that sense, and in order to respond to the demanding rules and recommendations, during the process of writing the reports for the doctoral programmes the UAB included some activity types designed to gain transferable skills, approving a generic list of activities from which each programme can select the obligatory and optional ones.

On the other hand, the different calls for pre-doctoral and postdoctoral grant applications on the autonomous regional level (Researcher Training Grants, Industrial Doctorates), national level (Training Grants for University Teaching Staff) and European level (Innovative Training Network grants) (see tables 1 and 2) demand that the university can guarantee transferable and/or teaching skills training for contracted research staff. Some of the grants, such as the Researcher Training Grants and the Industrial Doctorates, offer remuneration to PhD students for taking these transferable skills activities, whether within the university or the company.

Until the 2014/2015 academic year, the Doctoral School at the UAB did not carry out any specific activities for training PhD students in transferable skills. However, at several points of the campus such as the libraries service, pre- and postdoctoral researchers were offered the opportunity to attend free or fee-paying training activities. Some PhD programmes even offered seminars or specific training activities that indirectly met the training needs of students in terms of transferable skills.

Full researchers were not the only ones who need training in transferable skills, but junior researchers as well. Calls for the postdoctoral Beatriu de Pinós grant from the Catalan Agency for the Management of University and Research Grants, as well as the contracting of Marie Skłodowska-Curie researchers within the Horizon 2020 programme of the European Commission demand that universities can guarantee training in transferable skills (table 1).

Beyond the provisions offered by the research grants, The European Charter for Researchers⁴, adopted by the European Commission, and which defines the functions, responsibilities and rights of researchers and their employers or funding organisations, places emphasis on professional training and development of researchers at all stages of their professional careers. Among the principles and general requirements applicable to researchers, and in reference to continuing professional development, the charter states that:

Researchers at all career stages should seek to continually improve themselves by regularly updating and expanding their skills and competencies. This may be achieved by a variety of means including, but not restricted to, formal training, workshops, conferences and e-learning. (European Commission, 2005, p. 15)

In the case of employers and funding organisations, one of the 19 principles refers to access to training in research and continuing development:

Employers and/or funders should ensure that all researchers at any stage of their career, regardless of their contractual situation, are given the opportunity for professional development and for improving their employability through access to measures for the continuing development of skills and competencies. (European Commission, 2005, p. 19)

⁴ European Commission (2005). *The European Charter for Researchers. The Code of Conduct for the Recruitment of Researchers*. Brussels: European Commission. Directorate-General for Research, Human Resources and Mobility (Marie Curie Actions). Recuperat de https://euraxess.ec.europa.eu/sites/default/files/am509774cee_en_e4.pdf (Consulted 22/01/2018)

Table 1. Comparative skills/competences in which researchers holding pre- and post-doctoral grants are required to be trained. Prepared by the authors.

	PRE-DOCTORAL					POST-DOCTORAL			
	AGAUR Researcher training	MECD University Teaching Staff	ITN CALL FOR GRANT APPLICATIONS ⁵	INDUSTRIAL DOCTORATES	UAB GRANTS ^a	MARIE CURIE – COFUND	MARIE CURIE - Individual Fellowships	JUAN DE LA CIERVA/ RAMÓN Y CAJAL ^a	BEATRIU DE PINÓS
Training and science/research areas	✓	✓	✓	✓	✓	✓	✓		✓
University teaching skills		✓							
Transferable skills			✓			✓	✓		
Communication			✓				✓		
Project management and coordination			✓	✓					✓
Organisation									✓
Team work			✓						
Leadership				✓					✓
Transfer	✓			✓			✓		
Team management and leadership	✓								
Management activities	✓								
Entrepreneurship	✓		✓	✓					✓
RRI	✓								
International projection activities	✓								
R&D impact and capacity						✓	✓		
Patents				✓					
Industrial/intellectual property			✓	✓					✓
Ethics			✓						
Standardisation			✓						
Innovation			✓						
Open science culture			✓						
Questions of gender							✓		

⁵ Includes: European Training Networks (ETN), European Industrial Doctorates (EID) and European Joint Doctorates (EJD).

2.2. The opinions of different actors on the professional competences of researchers and their training

As part of the design process for the Professional Researcher Training Programme of the Universitat Autònoma de Barcelona, a survey was conducted. It included actors involved in the process of skills development for trainee researchers (PhD programme coordinators), actors responsible for contracting future PhDs outside Academia (employers) and the researchers themselves (first year trainee researchers and researchers about to or recently completed their PhD training).

The data collection period was from December 2016 to May 2017 and involved two focus groups – one with employers (n=7) and one with 3rd and 4th year trainee researchers (n=8) as well as two questionnaires – one for the PhD programme coordinators (30 out of 60) and another form 1st year trainee researchers (n=70).

The process of collecting and analysing this data had a three-fold objective:

- To find out opinions about the skills that trainee researchers should develop during their PhD programme.
- To detect strengths and weaknesses in the training UAB researchers receive during the period of preparing their PhD theses.
- To detect needs for professional development and improvement in the employability of researchers both within and outside the academic field.

2.2.1. Results

Below is a summary of the data collected and a comparison between the different providers⁶. The presentation of the data revolves around three questions: (a) which competences can researchers achieve within the framework of the PhD programmes? (b) which competences is it necessary for them to achieve? and (c) what should transferable skills training consist of?

A. Which competences can researchers achieve within the framework of the PhD programmes?

In the opinion of the coordinators, from a reference list of 17 transferable skills defined by the European Science Foundation [ESF] in 2009, there are only 2 that trainee researchers can achieve in 53% of the PhD programmes at the UAB. They are:

- *“Written and spoken communication/presentation”*, since students have to write the thesis or articles if they are presenting a compendium thesis, as well as annual progress reports in writing and sometimes before an assessment panel.
- *“Knowledge of research methods”*, since many of the programmes organise specific training in methodology. This is considered to be the main competence during this period of training.

According to the results presented in Graph 1 (see the following page), we can say that PhD programmes at the UAB contribute little in the way of developing transferable skills. It should be

⁶ The reports of the results separately by group can be seen in Annexe 1.

stated, however, that around 10% of coordinators did not consider whether these skills could be attained or not within the framework of their programmes.

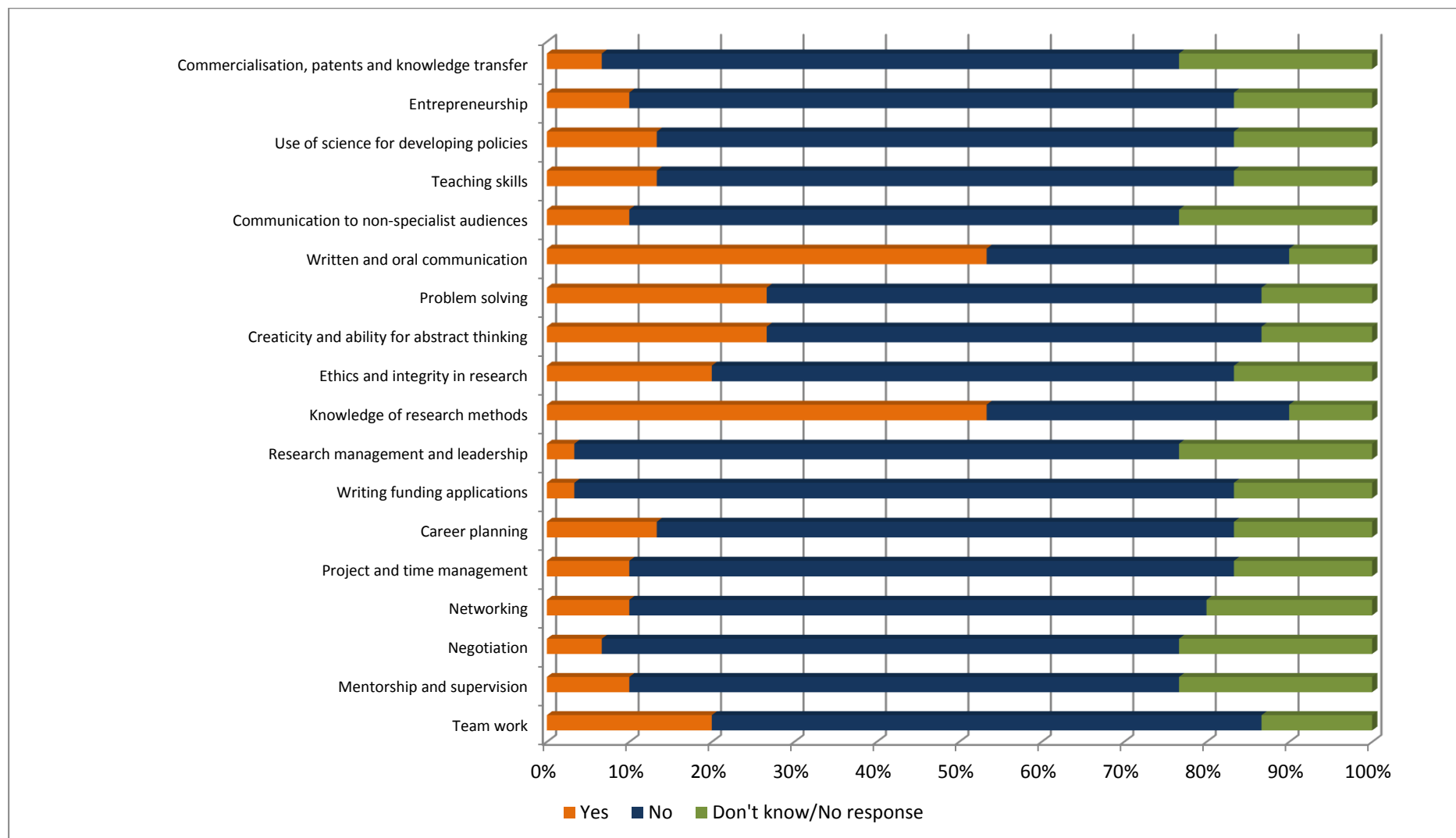
Prioritising the results in accordance with the percentage of positive responses, we obtained the following list of competences which trainee researchers can acquire within the framework of the PhD programmes (see table 3):

Table 1. Prioritised list of competences that are achieved within the framework of PhD programmes at the UAB in accordance with the positive responses received from the coordinators.



The results therefore point to the need to structure training activities that allow these competences to be achieved, and more so considering that 3rd and 4th year researchers and recent PhDs also stated that doctoral programmes contribute very little when it comes to developing the capacities and skills that are currently required to be a competent researcher, both within and outside the Academia, and that are demanded by employers.

Graph 1. Competences that researchers can achieve within the framework of their PhD programmes according to the coordinators.



B. Which competences are necessary for researchers to achieve?

Both for the employers and the 3rd and 4th year researchers and recent PhDs, the PhD programme should be considered as another period of training, and not just a bridge to access positions at the university. A change of mind-set by active researchers taking part in PhD programmes is therefore demanded as well as a greater proximity to the reality of companies. So, beyond research skills – which are believed to be satisfactorily covered by the Master’s degree and PhD activities – skills in management, organisation and planning should be introduced to move towards a more multi-skilled researcher profile.

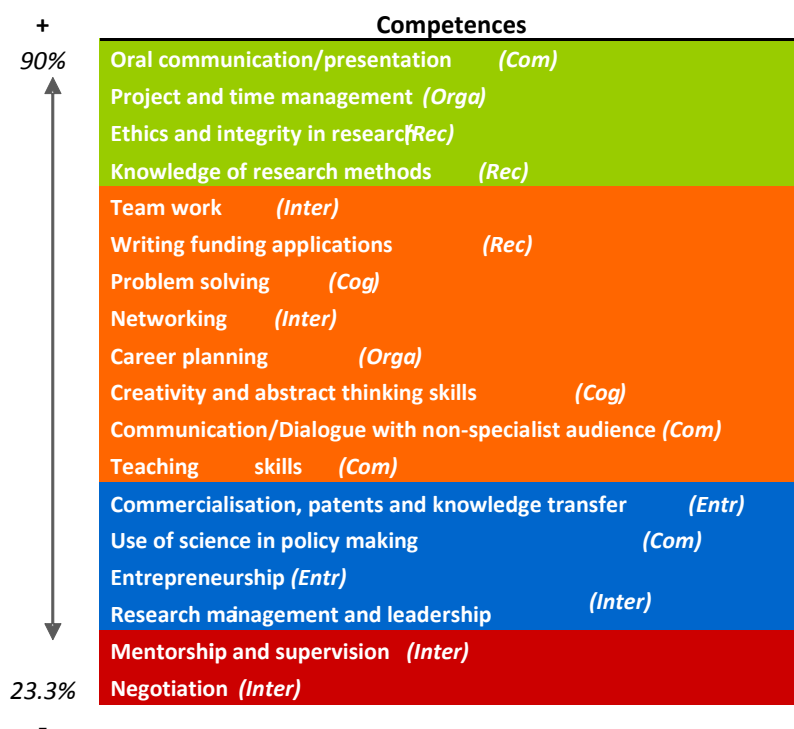
Employers consider that the researcher of the future should fit the following profile:

- *Good scientist and good manager*: able to plan and manage projects, manage his/her own time, cost projects, etc. as well as knowing different research methods and data analysis procedures, etc.
- *Multi-skilled and resourceful*: adaptable, with the capacity to find resources and an entrepreneurial attitude, etc.
- *Knowledgeable of ICT*: more specifically, big data, digitalisation, technologies for both analysis and development of methodologies, etc.
- *With certain personal characteristics*: flexibility, adaptability, curiosity; creativity, design thinking; capacity for team working, leadership qualities, capacity for problem solving and decision making, etc.

The coordinators of PhD programmes clearly consider that researchers have to acquire competences linked to “*Oral and written communication/presentation*”, “*Project and time management*” and “*Ethics and integrity in research*” with the latter linked to the competence area of research skills. On the other hand, competences that are thought to be least required are “*Negotiation*”, “*Mentorship and supervision*” and “*Research management and leadership*” (see Figure 1). It should be pointed out that some coordinators only indicate the competences that they prioritise, leaving aside those that they consider have been achieved in previous periods (such as cognitive skills) or those that they think are more appropriate to postdoctoral researchers (such as project management and writing applications for funding). It was also mentioned that teaching skills are necessary for researchers in contracted training but not so much for those who are not in that situation.

For their part, the 1st year researchers showed an interest in receiving training in the set of transferable skills indicated by the ESF. Most interest was shown in “*Knowledge of research methods*”, “*Oral and written communication/presentation*” and “*Problem solving*”. On the other hand, those involving “*Negotiation*”, “*Commercialisation, patents and knowledge transfer*” and “*The use of science in policy development*” held less interest.

Figure 1. Prioritised list of competences which trainee researcher should acquire during the period of their PhD training in accordance with the % of positive responses received from PhD programme coordinators.




After comparing the results of the competences that trainee researchers should acquire throughout their doctoral studies, the opinion of the PhD programme coordinators and the interest declared by the 1st year researchers to be trained in the transferable skills identified by the ESF (see table 4), it can be observed that for both groups the most important is “*Oral and written communication/presentation*” and the least is “*Negotiation*”, closely followed by “*Entrepreneurship*”. On the other hand it is significant that for the coordinators the most important skills for student training are “*Writing funding applications*” and “*Ethics and integrity in research*”.

Table 2. List comparative priorities for competences by coordinators v. 1st year PhD students.

COMPARATIVE POSITION	PRIORITISED POSITION		DESCRIPTOR	AREA OF COMPETENC
	COORDINATORS	STUDENTS		
+ 3	5	8	Working with others/Team work	Interpersonal skills
	17	12	Mentorship and supervision	
	18	18	Negotiation	
+ 5	7	13	Networking	Organisational skills
+ 4	2	6	Project and time management	
+ 3	8	11	Career planning	Research skills
+ 8	6	14	Writing funding applications	
	16	10	Research management and leadership	
	4	2	Knowledge of research methods and techniques	
+ 6	3	9	Ethics and integrity in research	Cognitive skills
	9	4	Creativity and ability for abstract thinking	
	6	3	Problem solving	

COMPARATIVE POSITION	PRIORITISED POSITION		DESCRIPTOR	AREA OF COMPETENC
	COORDINATORS	STUDENTS		
	1	1	Oral and written communication/presentation	Communication skills
	11	7	Communication/dialogue with non-specialist public	
	12	5	Teaching skills	
+ 2	14	16	Use of science for policy developing policies	
	15	15	Entrepreneurship	Entrepreneurship skills
+ 4	13	17	Commercialisation, patents and knowledge transfer	

 Same position.

 Considered more important by coordinators than by 1st year researchers.

C. What should transferable skills training consist of?

3rd and 4th year trainee researchers who have participated in the activities of their own PhD programme and in transferable activities organised by the Doctoral School, consider that work should be ongoing to guarantee an appropriate offer of transferable skills training activities which:

- Connect with the interests and needs of the trainee researchers.
- Form an interdisciplinary training of interest regardless of the area and ambit of knowledge.
- Have a dual component: theory and practice.
- Favour spaces for socialising and networking.

For their part, the PhD programme coordinators indicate that, in addition:

- Training activities should be short-term training modules.
- Most of the training activities should be in English.
- Training activities should not interfere with the process of preparing the theses.

Finally, there were some proposals for improving the organisation of training activities:

- Improve the dissemination of activities, centralising the publication and information of these activities through a single channel.
- Approach the subject of employment opportunities outside the university environment.
- Inform students of the services they have access to.

3. THE MODEL OF PROFESSIONAL COMPETENCES FOR RESEARCHERS AT THE UAB.

Researchers have to develop a series of competences that will allow them to make adequate progress in their career. Beyond research skills and specific information in their field of knowledge, they require the capacities and skills that will prepare them for a flexible and competent professional future, which can lead to work either within or outside the university. In this scenario, the development of generic or transferable skills is particularly important, understanding them as:

...skills learned in one context (for example research) that are useful in another (for example future employment whether that is in research, business etc). They enable subject- and research related skills to be applied and developed effectively. Transferable skills may be acquired through training or through work experience. (ESF, 2009, p. 47)

The Universitat Autònoma de Barcelona [UAB] is committed to training its researchers to promote continuing development of their capacities and skills, in compliance with the regulatory recommendations that have appeared in recent years.

Setting out from the list of 17 transferable skills proposed by the ESF⁷ (2009) -later grouped by the the OCDE (2012)⁸ into 6 categories- and taking into account other models such as the UK Researcher Development Framework (VITAE, 2011)⁹, we have established a model of professional competences for researchers at the UAB which includes 22 descriptors in 6 areas of competence (see figures 2 and 3).

Figure 2. Model of professional competences for researchers at the UAB.



A partir d'ESF (2009) i OCDE (2012)

⁷ ESF (2009) *Research Careers in Europe Landscape and Horizons*. Recovered from http://archives.esf.org/fileadmin/Public_documents/Publications/moforum_research_careers.pdf

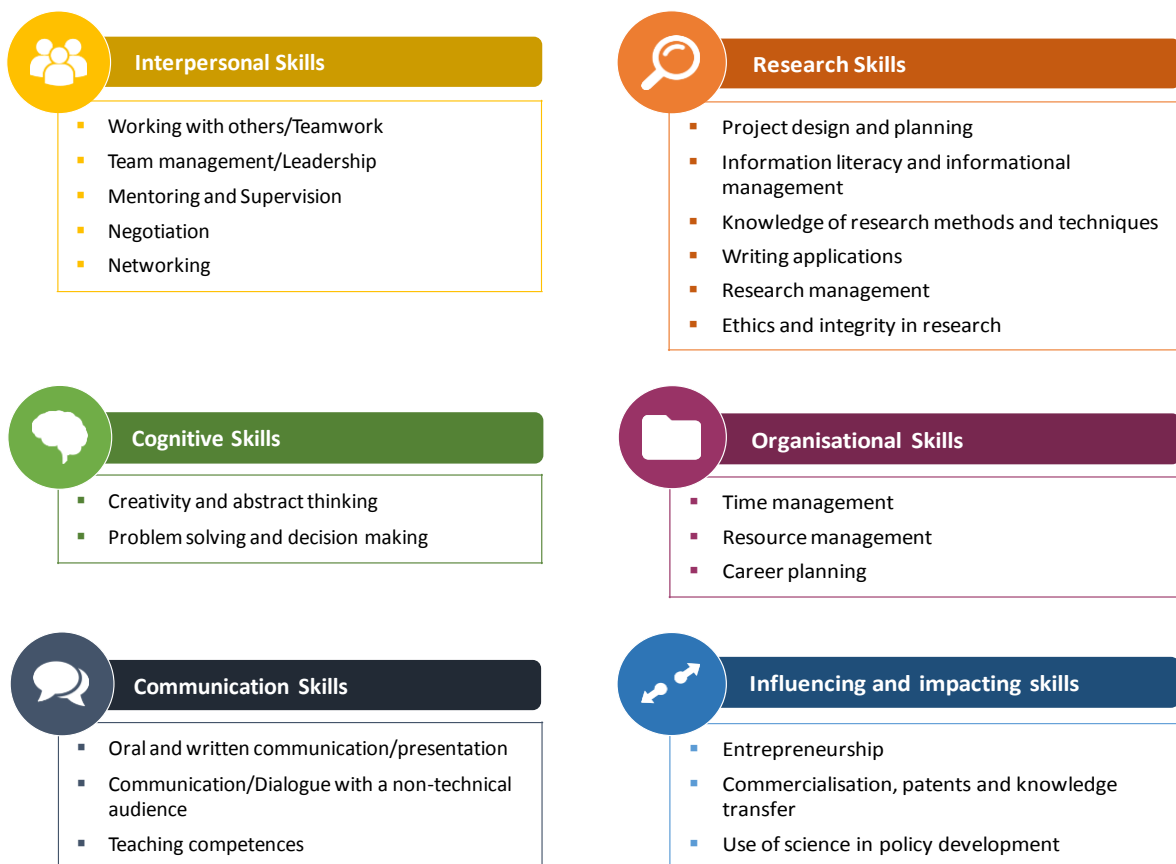
⁸ OECD (2012). *Transferable skills training for researchers: Supporting career development and research*. OECD Publishing. DOI: 10.1787/9789264179721-en. Recovered from de <http://www.oecd.org/science/transferableskills.htm>

⁹ VITAE (2011, 2^a ed.). *Researcher Development Framework*. Careers Research and Advisory Centre (CRAC). Recovered from <https://www.vitae.ac.uk/vitae-publications/rdf-related/researcher-development-framework-rdf-vitae.pdf/@@download/file/Researcher-Development-Framework-RDF-Vitae.pdf>

In defining this model of competences, the UAB seeks to ensure that researchers can acquire professional transferable skills that enable them to:

- Establish effective professional relationships and links with all kinds of people and groups.
- Identify, plan and resolve problems effectively and meaningfully.
- Transmit information clearly and comprehensively to all kinds of people and groups.
- Develop valid, useful and quality projects.
- Effectively manage individual work and that of employees they are responsible for.
- Influence and have an impact on the academic, social, cultural and economic environments.

Figure 3. Areas and descriptors of competences in the model of professional competences for researchers at the UAB.






The definition of the model of professional competences for researchers at the UAB has a three-fold objective

- Identify and define the key competences to be developed over the different career stages of researchers to contribute to their professional and personal development.
- Provide a framework of reference for planning training activities which contribute to the development of professional competences for researchers.
- Provide a framework of reference for the assessment/self-assessment of professional competences in the area of research.

Below is the definition of areas of competence and the descriptors contained within them (see table 5). It should be pointed out that the order in which they appear does not imply an order of priority.

Table 3. Description of areas of competence and descriptors of the model of professional competences for researchers at the UAB.

AREA OF COMPETENCE	DESCRIPTORS	DESCRIPTION
<p>(C1) Interpersonal skills</p>  <p>Includes the skills necessary for establishing effective professional relationships and links with all kinds of people and groups.</p>	(c1.1) Working with others/Team work	Capacity to contribute to team work, avoid and/or resolve conflicts, motivate others and promote a collaborative working environment.
	(c1.2) Team management/leadership	Capacity to lead a group, create a shared vision and goal, and motivate a working independently of their race, gender, sexual orientation and religious affiliation.
	(c1.3) Mentorship and supervision	Capacity to respond effectively to advice and criticism, and to guide and give support and advice to others.
	(c1.4) Negotiation	Capacity to promote consensus: in other words, to bring different criteria together and reach agreements which benefit all parties.
	(c1.5) Networking	Capacity to establish personal and professional relationships and construct a broad network of contacts for exchanging personal and professional information.
<p>(C2) Cognitive skills</p>  <p>Includes the skills necessary for the identification, planning and solution of problems effectively and meaningfully.</p>	(c2.1) Creativity and ability for abstract thinking	Capacity to go beyond ideas, norms and traditional relations to create new ideas, methods and interpretations.
	(c2.2) Problem solving and decision making	Capacity for defining problems and finding solutions that are appropriate to the context.
<p>(C3) Communicative skills</p>  <p>Includes the skills necessary for transmitting information clearly and comprehensively to all kinds of people and groups.</p>	(c3.1) Communication/ oral and written presentation	Capacity to understand, interpret, create and communicate information appropriately, both orally and in writing.
	(c3.2) Communication/dialogue with non-specialist public	Capacity to communicate and conduct conversations and dialogue orally and in writing to a non-specialist audience.
	(c3.3) Teaching skills	Capacity to train and support the learning process of students when involved in tasks of learning and demonstrating.

AREA OF COMPETENCE	DESCRIPTORS	DESCRIPTION
<p>(C4) Research skills</p>  <p>Includes the skills necessary for carrying out valid, useful and quality projects.</p>	(c4.1) Project design and planning	Capacity for planning projects that respond to realistic objectives.
	(c4.2) Information literacy and management	Ability to know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.
	(c4.3) Knowledge of research methods and techniques	Capacity to apply a broad range of research methods and techniques with confidence.
	(c4.4) Writing funding applications	Capacity to write and present funding applications.
	(c4.5) Research management	Capacity to manage, research projects with professionalism, transparency and responsibility.
	(c4.6) Research ethics and integrity	Capacity to apply ethical and research directives.
<p>(C5) Organisational skills</p>  <p>Includes the skills necessary for the efficient management of researchers' own work and that of the employees they are responsible for.</p>	(c5.1) Time management	Capacity for efficient time management and to complete tasks and project within deadlines.
	(c5.2) Resource management	Capacity to plan and manage the resources necessary to carry out a project.
	(c5.3) Career planning	Capacity to manage, plan and make informed decisions about professional careers.
<p>(C6) Influence and impact skills</p>  <p>Includes the skills necessary for being able to have an influence and an impact on the academic, social, cultural and economic environments.</p>	(c6.1) Entrepreneurship	Capacity to turn ideas into actions.
	(c6.2) Commercialisation, patents and knowledge transfer	Capacity to identify and understand the aspects of individual research, which could have an impact in the socioeconomic environment.
	(c6.3) Use of science for policy development	Capacity to inform and influence policy makers through individual research.

4. TRAINING PLAN IN TRANSFERABLE SKILLS FOR TRAINEE RESEARCHERS

The transferable skills training plan for trainee researchers (pre-docs) aims to offer transferable skills training relating to the interpersonal, cognitive, communicative, research, organisational and influence and impact competences necessary for the production of the doctoral thesis, as well as for a subsequent career as a researcher either within or outside the academic university environment.

The training plan is structured according to the duration of the PhD programme, distributing the activities over the three years, and taking into account the needs of the researchers at each stage of their training. It is open to trainee researchers, independently of whether they are grant holders or are contracted as research assistants or similar at the Universitat Autònoma de Barcelona. The programme is conceived of as a training path that complements the training organised within the framework of each PhD programme.

4.1. The modular training proposal

The modular training proposal proposes 16 training activities distributed over the three years of the PhD programme with three periods identified in each academic year (October to December, January to March and April to June). This timing seeks to guarantee an even distribution and programming of activities and respond to the training requirements, interests and concerns that trainee researchers may have at any stage of the PhD programme.

The activities are conceived as independent training modules that aim to include one or more of the competences contained in the model of professional competences for researchers at the UAB. They may take the form of talks, workshops, seminars and courses designed to cover different points of interest to researchers beginning their research careers, independently of their area of knowledge.

This programme of transferable skills activities is considered not only to increase the capacity of trainee researchers but also to encourage links between researchers from different areas of knowledge.

Figure 4 shows the extent to which the proposed training activities are linked, given that some of them cover related areas. The possible relationships that exist between some of the activities will indicate the appropriateness of organising some of the activities before others.

Figure 4. Relationship between training activities and distribution over the 3 years of the PhD programme.

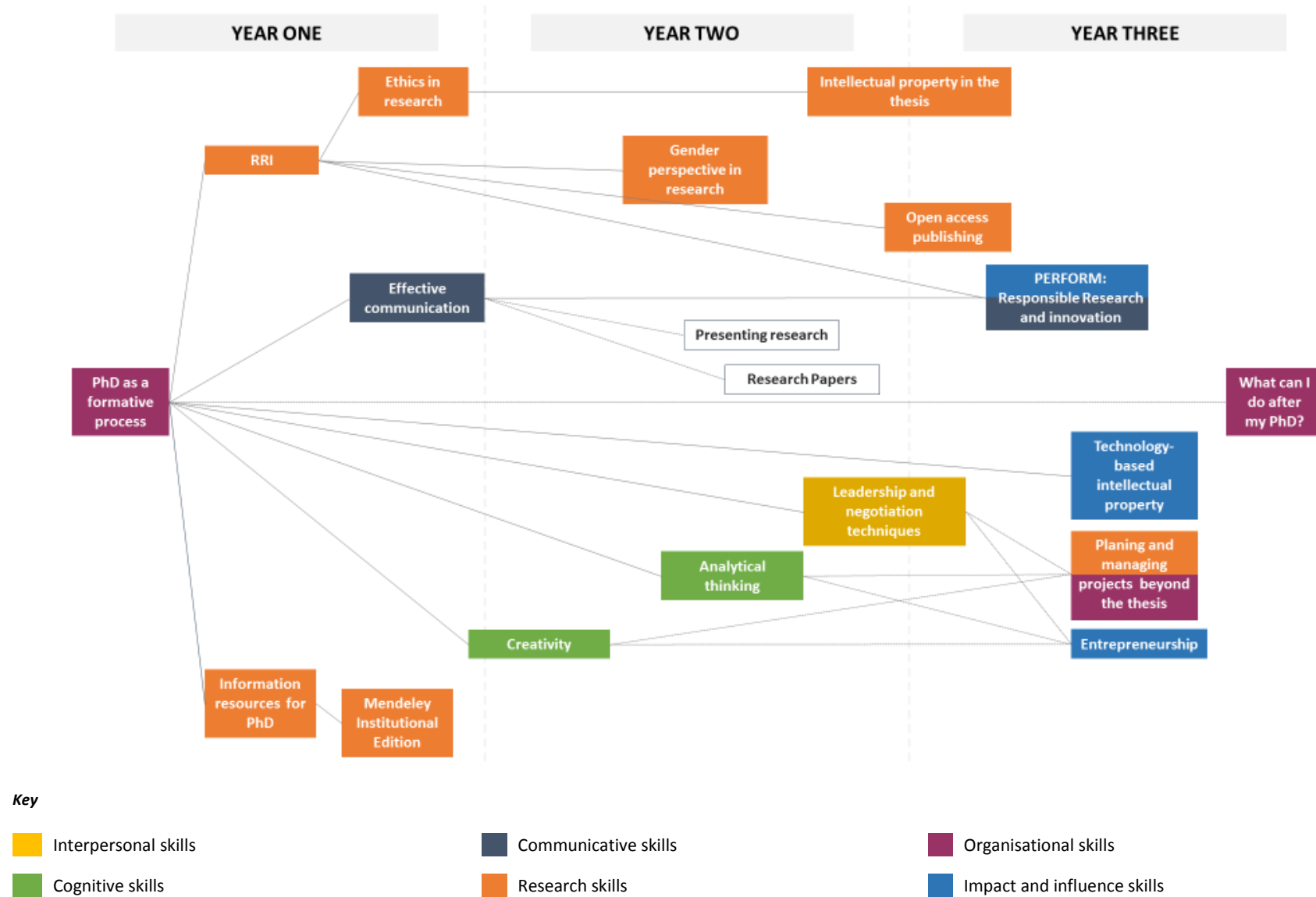


Figure 5 shows the timing of the training activities throughout the PhD period, taking into account the annual programming of events that have to be offered by services such as the Libraries Service or the Research Park. Given the large number of students registered for PhD programmes, it may be necessary to programme some of the activities more than once a year to ensure that everyone has access – especially activities requiring small groups – and training should also be offered in Catalan/Spanish and English to accommodate the large numbers of foreign students.

Beyond the training activities included in this proposal researchers, trainee researchers can also take part in workshops, talks and seminars organised occasionally which could be of interest and other activities organised by the Libraries Service, the Language Service, the Observatory for Equality or the Employability Service, which are not included in this proposal. In any case, these activities should be disseminated among the trainee researchers where their content is linked to the Model of Professional Competences for Researchers at the UAB.

Finally, and given that some calls for employing trainee researchers include teaching skills in a university environment among the requirements for applicants, the UAB offers the FDES programme which accredits teacher training in higher education. The programme is managed by the Teacher Training and Innovation Unit and is open to all teaching and research staff. For more information, see <http://www.uab.cat/web/personal-uab/personal-uab/personal-academic-i-investigador/formacio-i-innovacio-docent/programes-fdes/estructura-1345703511726.html>

Figure 5. Proposal for timing of training activities.

	1st training period (October to December)		2nd training period (January to March)			3rd training period (April to June)		
Year 1		PhD as a formative process	RRI	Ethics in research		Information resources for PhD	Mendeley Institutional Edition	Efficient communication ¹⁰
Year 2	Creativity	Analytical thinking for problem-solving and decision-making		Gender perspective in research	Intellectual property in the thesis		Open access publishing	Leadership and negotiation techniques
Year 3		PERFORM: Responsible research and innovation	Planning and managing projects beyond the thesis		Entrepreneurship	Technology-based intellectual property		What can I do after the PhD?

Key

- Interpersonal skills
- Communicative skills
- Organisational skills
- Cognitive skills
- Research skills
- Impact and influence skills

¹⁰ The Language Service of the UAB can offer open courses in “Presenting Research” and “Research Papers” for trainee researchers.

4.1.1. Description of training activities

Below is a brief description of the proposed training activities, with reference to the objectives, content and competences to be worked on. This proposal is open to suggestions and proposals for improvement.

Year one

PhD AS A TRAINING PERIOD (3 hours)	
Description	This seminar aims to welcome first-year PhD students and answer some of the basic question about the PhD programmes and research at the UAB as well as to emphasise the importance of transferable skills training in this new period.
Objectives	<ul style="list-style-type: none"> ▪ Raise awareness of the importance of developing transferable skills, which will prepare them for their future career as researchers. ▪ Explain the basic function of the platforms that students need to use to manage documentation relating to the production of their theses. ▪ Provide basic information about the UAB research structures and services. ▪ Present the European Research Charter and the Euraxess initiative.
Content	<ol style="list-style-type: none"> 1. The Doctoral School of the UAB. 2. Doing research at the UAB. 3. The European Research Charter and the Euraxess initiative. 4. The PhD as a training period: development of competences and transferable skills training activities. 5. The website of the Doctoral School. Introduction to the Sigma platform and management of the portfolio.
Competences and description of competences	<i>Main competence</i> (c5) Organisational skills (c5.3) Career planning

RESPONSIBLE PhDs: RRI AND PhD RESEARCH PROJECTS (25-30 hours – 1 ECTS credit) ¹¹	
Description	This course aims to introduce PhD students to different concepts of Responsible Research and innovation (RRI) and engage them in a process of reflection and discussion of how RRI can be conceived and put into practice.
Objectives	<ul style="list-style-type: none"> ▪ Analyse and discuss the main characteristics of the different concepts of RRI and their implications for research practice. ▪ Apply different concepts of RRI with the aim of identifying possible paths to establishing more responsible research and innovation processes.
Content	<ol style="list-style-type: none"> 1. Concept of RRI. 2. RRI in practice: looking more closely at RRI. 3. RRI in student research projects. 4. Responsible PhDs: conclusions.
Competences and description of competences	<i>Main competence</i> (C4) Research skills (c4.6) Research ethics and integrity

¹¹ Description of the HEIRRI project in which the UAB participates as a collaborating organisation in the process of piloting the training materials.

ETHICS IN RESEARCH

Proposal (3 hours) – Ideas taken from the P-Sphere course

Description	Training activity in which the basic aspects to be considered for carrying out research that is methodologically, ethically and legally acceptable are developed. Through the UAB code of good practice in research, aspects common to any research and specific aspects to be taken into account when carrying out research with human beings, animals and certain agents will be addressed.
Objectives	<ul style="list-style-type: none"> ▪ Provide the main conceptual bases of ethics in research. ▪ Give information about the code of good practice in research applied at the UAB. ▪ Promote reflection on students' research projects of question of ethics and human rights.
Content	<ol style="list-style-type: none"> 1. UAB code of good practice in research. 2. Plagiarism and self-plagiarism. 3. The UAB Ethics Committee.
Competences and description of competences	<p><i>Main competence</i></p> <p>(C4) Research skills</p> <p>(c4.6) Research ethics and integrity</p>

INFORMATION SEARCH AND MANAGEMENT: INFORMATION SOURCES IN SPECIFIC AREAS (2 hours)

Description	Training activity which aims to offer a panorama of the main bibliographic information sources, both contracted and free access, with information on search strategies, possible storage and exportation of results.
Objectives	<ul style="list-style-type: none"> ▪ Learn to make use of and manage different information sources. ▪ Learn to streamline the process of localisation, search and recovery of information.
Content	<ol style="list-style-type: none"> 1. Information needs. 2. Designing a search strategy. 3. Defining the search topic. 4. Evaluating the results. 5. Catalogues. 6. Internet searches. 7. Databases.
Competences and description of competences	<p><i>Main competence</i></p> <p>(C4) Research skills</p> <p>(c4.2) Information literacy and management</p>

INFORMATION SEARCH AND MANAGEMENT: MENDELEY INSTITUTIONAL (2 hours)

Description	Training activity which aims to offer a broad view of the Mendeley bibliographic manager which allows the organisation, management and sharing of information.
Objectives	<ul style="list-style-type: none"> ▪ Learn to create a bibliographic database. ▪ Learn to organise, import and share references obtained from different information sources. ▪ Learn to create automatic bibliographic lists in different citation styles for later inclusion in the text documents.
Content	<ol style="list-style-type: none"> 1. What is Mendeley?

	<ol style="list-style-type: none"> 2. Access to Mendeley. 3. Double platform: Online vs. Offline. 4. Creating a personal library. 5. Managing folders and documents. 6. Making bibliographic lists and inserting them in text. 7. Working in a group.
Competences and description of competences	<i>Main competence</i> (C4) Research skills (c4.2) Information literacy and management

EFFECTIVE COMMUNICATION

Proposal (10 hours) – Ideas extracted from Language Service courses

Description	Course that aims to optimise the oral and written communication competence of trainee researchers, enabling them to improve strategies for the effective communication of oral and written formal texts in any language.
Objectives	<ul style="list-style-type: none"> ▪ Provide techniques and resources for the improvement of oral communication in a variety of communication situations. ▪ Provide techniques and resources for the improvement of written texts, with special emphasis on aspects of writing style, cohesion and coherence.
Content	<ol style="list-style-type: none"> 1. Oral communication <ul style="list-style-type: none"> - Planning the presentation. - Verbal, paraverbal and corporal discourse. - Preparing a presentation using PowerPoint and other programmes. - Overcoming stage fright. 2. Written communication <ul style="list-style-type: none"> - Basic ideas about written communication. - The writing process. - Practical advice for writing: sentences, connectors, punctuation.
Competences and description of competences	<i>Main competence</i> (C4) Communication skills (c4.2) Oral and written communication/presentation

Year two

CREATIVITY

Proposal (1 or 2 days) – Review of other courses

Description	<p>Course aiming to offer theoretical and practical training by presenting researchers with different techniques for creativity that could be useful in different scenarios, both for the preparation of the thesis and in their future professions.</p> <p>The initial activity will be a reflection on the concept of creativity and the characteristics of a creative person, focussing on creativity related to research. Afterwards we will consider barriers to creativity. Finally, using a theoretical and practical focus, we will present different techniques for creativity and test them out in practice.</p>
Objectives	<ul style="list-style-type: none"> ▪ Analyse and discuss the concept of creativity. ▪ Understand creativity techniques to generate ideas and useful solutions.

	<ul style="list-style-type: none"> ▪ Introduce creative thinking in the process of designing and developing projects.
Content	<ol style="list-style-type: none"> 1. What is creativity? What makes a creative person? 2. Creativity in research. 3. What stops us from being creative? Barriers to creativity. 4. How can we become more creative? Techniques and strategies for greater creativity.
Competences and description of competences	<p><i>Main competence</i></p> <p>(C2) Cognitive skills</p> <p>(c2.2) Creativity and ability for abstract thinking</p>

ANALYTICAL THINKING FOR PROBLEM-SOLVING AND DECISION-MAKING

Proposal (2 days, 10 hours) – Ideas extracted from a course for Administration and Services staff at the UAB

Description	Course aiming to help researchers develop analytical thinking to enable them to make reasoned decisions and find useful solutions to any problem that may arise.
Objectives	<ul style="list-style-type: none"> ▪ Develop a set of skills related to analytical thinking to be able to analyse and solve problems. ▪ Recognise the different styles and phases in the decision-making process from an analytical way of thinking. ▪ Generate significant knowledge gained in the classroom, which can be transferred when analysing problems and making decision related to those problems.
Content	<ol style="list-style-type: none"> 1. Problem analysis <ul style="list-style-type: none"> - Situations in professional life which require analytical thinking. - Problem analysis: detection of potential problems. - Framing the problem: Analytical v. systematic thinking. - Analysing the causes of a problem. - Observing the consequences of decision-making and action plan. - Generating alternatives: evaluating the proposed solutions and establishing criteria for choice and optimisation. 2. Decision making <ul style="list-style-type: none"> - Styles of decision-making. - Stages in decision-making. - Types of decisions. - Level of decisions. - Emotional v. rational decisions.
Competences and description of competences	<p><i>Main competence</i></p> <p>(C2) Cognitive skills</p> <p>(c2.2) Problem solving and decision making</p>

PERSPECTIVE OF GENDER IN RESEARCH (4 hours)

Description	<p>Workshop aiming to offer transferable skills for designing research, which takes into account the dimension and perspective of gender, as recommended in the Objectives for Equality of the Horizon 2020 programme.</p> <p>This workshop will allow trainee researchers to reflect on their own research and designs, and channel their capacity to revise research proposals from the dimension and analysis of sex and gender, exchanging presuppositions, knowledge and experiences.</p>
Objectives	<ul style="list-style-type: none"> ▪ Gain basic theoretical, epistemological and technical knowledge to incorporate the

	dimension and perspective of gender in the designing and carrying out of research and innovation projects.
Content	<ol style="list-style-type: none"> 1. Fundamental content on the dimension and perspective of gender: <ul style="list-style-type: none"> - The system of sex and gender and inequalities between women and men. - Androcentric bias in different scientific and technological disciplines. - Keys to feminist epistemology. 2. The inclusion of the gender perspective in research projects: <ul style="list-style-type: none"> - The dimension and perspective of gender in the research cycle: from the formation of teams, research design and the dissemination of results. - Basic references, bibliography and instruments of support from the European Commission and other national and international organisations. - Case analysis of different research projects from the dimension and perspective of gender.
Competences and description of competences	<i>Main competence</i> (C4) Research skills (c4.6) Research ethics and integrity

INTELLECTUAL PROPERTY IN THE PRODUCTION OF THE THESIS (2 hours)

Description	Training activity that aims to offer an overview of all the aspects to be taken into account to ensure that the rights of third parties are not infringed when writing the thesis and to explain how it is published in an institution repository as established in article 14 of Royal Decree 99/2011.
Objectives	<ul style="list-style-type: none"> ▪ Give information about authors' rights and other related topics so that students can write up their research while respecting the rights of third parties. ▪ Explain the procedure for the publication of the thesis in the TDX repository.
Content	<ol style="list-style-type: none"> 1. Attribution of rights, concession of rights, works in the public domain. 2. Respecting the rights of third parties when writing the thesis. 3. The thesis in TDX and in the DDD.
Competences and description of competences	<i>Main competence</i> (C4) Research skills (c4.2) Information literacy and management (c4.6) Research ethics and integrity

OPEN ACCESS PUBLICATION (2 hours)

Description	Training activity centred on content related to open access publishing.
Objectives	<ul style="list-style-type: none"> ▪ Give information on Open Access policies.
Content	<ol style="list-style-type: none"> 1. What is Open Access? 2. Different available options for open access publishing. 3. Editorial policies regarding open access. 4. Application of open access policies at the UAB.
Competences and description of competences	<i>Main competence</i> (C4) Research skills (c4.2) Information literacy and management <i>Secondary competence</i> (C3) Communication skills

LEADERSHIP AND NEGOTIATION TECHNIQUES

Proposal (minimum 2 days, 6 hours) – Ideas extracted from UAB Summer School

Description	Course aiming to offer a theoretical and practical training in leadership and negotiation. Trainee researchers learn to become the best leaders and perfect their style and capacity for negotiation. They also improve their team working and networking skills.
Objectives	<ul style="list-style-type: none"> ▪ Learn leadership and negotiation techniques to maximise the effectiveness and contribution to the work. ▪ Learn strategic management skills for managing teams effectively.
Content	<ol style="list-style-type: none"> 1. Leadership <ul style="list-style-type: none"> - Type and styles. - Sources of power. - Motivation. - Delegation and team work. Team roles and personality roles. - Communication in organisations: internal and external communication. 2. Negotiation <ul style="list-style-type: none"> - Interests and position of negotiation. - Criteria and attitudes for negotiating. - Types of conflict. - Stages in the negotiation process. - Negotiating strategies and techniques.
Competences and description of competences	<p><i>Main competences</i></p> <p>(C1) Interpersonal skills</p> <p>(c1.2) Team management and leadership</p> <p>(c1.4) Negotiation</p> <p><i>Secondary competences</i></p> <p>(C1) Interpersonal skills</p> <p>(c1.1) Working with others/Team work</p> <p>(c1.5) Networking</p> <p>(C2) Cognitive skills</p> <p>(c2.2) Problem solving and decision making</p>

Year three

PERFORM – RESPONSIBLE RESEARCH AND INNOVATION: HOW TO MAXIMISE THE LOCAL IMPACT OF MY RESEARCH (15 hours, distributed in 5 sessions)

Description	<p>The course <i>Responsible research and innovation: how to maximise the local impact of my research</i> offers practical and theoretical tools for carrying out responsible research in relation to society and covers questions of communication, participation and intervention with young people.</p> <p>The course is part of the European PERFORM research project, which explores ways of bringing young people closer to science through the stage arts in three different areas: stand-up comedy (Catalonia), the clown (France) and ‘Science busking’ (UK).</p>
Objectives	<ul style="list-style-type: none"> ▪ Facilitate access to different tools and skills for young people to communicate their research, critically analyse it and promote its local impact through dialogue with the public and a focus on participative research.
Content	<p>Session 1: Science with and for society</p> <ul style="list-style-type: none"> - The focus and values of Responsible Research and innovation (RRI): RRI, how and why? RRI in science education. - The PERFORM project: How to apply stage arts (stand-up comedy) to scientific

	<p>communication and education.</p> <ul style="list-style-type: none"> - Information about the project and learning. <p>Session 2: Key competences for a commitment to society.</p> <ul style="list-style-type: none"> - Commitment and participation: collaborative focus of communication and science education, inclusion and constructive dialogue. <p>Session 3: Philosophy and the ethics of science</p> <ul style="list-style-type: none"> - Philosophy of science. Can we define a scientific method? What is science good for? The problem of public confidence in science. - Ethic in scientific research and communication: What is the responsibility? Who are we responsible for? Funding, methods, products and risks. <p>Session 4: Towards practice I</p> <ul style="list-style-type: none"> - Communication skills for researchers: What is responsible communication? Placing it within the history of scientific communication. How can I make my PhD thesis understandable? <p>Session 5: Towards practice II</p> <ul style="list-style-type: none"> - The practice of responsible scientific communication: How can I plan, begin and extend activities that communicate the social dimension, norms and values of my research? - Reflection on the PERFORM project and the next steps.
Competences and description of competences	<p><i>Main competences</i></p> <p>(C3) Communication skills</p> <p>(c3.2) Communication/dialogue with non-specialist public</p> <p>(C6) Influence and impact skills</p>

PLANNING AND MANAGING PROJECTS BEYOND THE DOCTORAL THESIS

Proposal (5 or 6 hours)

Description	The course <i>Planning and managing projects beyond the doctoral thesis</i> aims to give trainee researchers basic notions that will allow them to plan and manage projects both in the scientific and business environments.
Objectives	<ul style="list-style-type: none"> ▪ Understand what a project is and what its characteristic are. ▪ Learn to identify and analyse initiatives to design project that respond to the needs and demands of each situation. ▪ Understand the life cycle of a problem. ▪ Learn to intervene in the organisational, human and social aspects of projects.
Content	<ol style="list-style-type: none"> 1. Project management. Basic concepts. 2. Project approval and definition. 3. Project planning: stages and life cycle of a project from its design to its implementation and evaluation. 4. Project organisation: resources management, time management and team and people leadership.
Competences and description of competences	<p><i>Main competences</i></p> <p>(C4) Research skills</p> <p>(c4.1) Project design and planning</p> <p>(c4.5) Research management</p> <p>(C5) Organisational skills</p> <p>(c5.1) Time management</p> <p>(c5.2) Resources management</p> <p><i>Secondary competence</i></p>

	(C1) Interpersonal skills (c1.2) Team management and leadership
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ENTREPRENEURSHIP (6 hours, 2 sessions)

Description	Course which aims to promote the entrepreneurial spirit in a transferable and multidisciplinary way among researchers, offering the tools needed to begin an entrepreneurial project and find new applications for the research.
Objectives	<ul style="list-style-type: none"> ▪ Promote the entrepreneurial attitude and spirit. ▪ Find new applications for individual research and turn them into market solutions. ▪ Give participants the necessary tools to transfer the results of their research.
Content	<ol style="list-style-type: none"> 1. What attitudes must be acquired to carry out an entrepreneurial project? <ul style="list-style-type: none"> - Introduction to entrepreneurship and entrepreneurial attitudes. - Management of entrepreneurial teams. - Group dynamics and identification of opportunities based on the knowledge of the participants. 2. How do I know if my project is potentially transferable and commercialisable? <ul style="list-style-type: none"> - Business Model Canvas. - Validation of the hypothesis using Lean Start-up methodology.
Competences and description of competences	<i>Main competences</i> (C6) Influence and impact skills (c6.1) Entrepreneurship (c6.2) Commercialisation, patents and knowledge transfer

TECHNOLOGY-BASED INTELLECTUAL PROPERTY (4 hours)

Description	Training activity designed to offer a general view of patents, know-how and models of use. At the end of the session, researchers will have acquired basic knowledge of how to protect their research and manage patents.
Objectives	<ul style="list-style-type: none"> ▪ Offer tools for evaluating individual research results with the aim of protecting them. ▪ Acquire basic knowledge to find out how to use the patent databases to obtain information that is useful for research projects. ▪ Offer a general overview of the technology transfer processes and present some examples of good practice.
Content	<ol style="list-style-type: none"> 1. Uses of technology-based intellectual property. 2. Patents: requirements and exclusions, structure, legal actions and infractions. 3. Models of use. 4. Know-how: when to keep information confidential and comparison with patents. 5. Information about patents: how to reap the benefits of research patented by others and multiple uses of the patents data bases
Competences and description of competences	<i>Main competence</i> (C6) Influence and impact skills (c6.2) Commercialisation, patents and knowledge transfer

AND AFTER THE PhD? (3 hours)

Description	This workshop aims to offer a broad overview of the possibilities that exist once the PhD is completed both within and outside the academic/university environment. Students will receive information about the resources available to trainee researchers to guide and develop their professional careers.
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Objectives	<ul style="list-style-type: none"> ▪ Give information of the employment opportunities both within and outside the academic/university environment. ▪ Give information about services and resources that are available to future researchers to find employment both within and outside the academic/university environment. ▪ Stimulate reflection on professional careers.
Content	<ol style="list-style-type: none"> 1. Employment opportunities for PhDs. 2. Being a researcher in Europe. 3. Sources of public financing: post-doctoral grants in Catalonia, Spain and Europe. 4. Experiences of past PhDs: different research career paths and the view of employers.
Competences and description of competences	<p><i>Main competence</i></p> <p>(c5) Organisational skills</p> <p style="padding-left: 40px;">(c5.3) Career planning</p>

5. IN CONCLUSION

As we indicated in the presentation section of this document, this is a first proposal for the design of the Professional Development Programme for Researchers at the Universitat Autònoma de Barcelona. Over the next few months, we will have to:

- Disseminate the proposal and the model of professional competences among members of the university community, a process that has in fact already begun by the publication of information on the Euraxess web page of the UAB (see: <http://www.uab.cat/web/investigar/itineraris/la-recerca/euraxess-uab/carrera-investigadora-1345718566160.html>).
- Involve the coordinators of the PhD programmes in the proposal for the training plan by raising awareness among their supervisors, tutors and trainee researchers of the need to broaden their professional competence base beyond the ability to use research methods and techniques in a certain field of knowledge.
- Design training activities aimed at recognised, independent and senior researchers, taking the model of professional competences as a base.
- Continue to foster collaborations for training actions, in line with those set up several months ago: Libraries Service, Language Service, Research Park, Observatory for Equality, Employability Service, Administration and Services staff Training Area, Office for Teaching Quality, among others.