Employers

EMPLOYABILITY AND UNIVERSITY EDUCATION IN THE FIELD OF BIOSCIENCES

AQU CATALUNYA

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EXECUTIVE SUMMARY

This report offers a comprehensive look at the degree programmes that make up the field of Biosciences, which may be linked to careers involving academic or industrial research in the health and life sciences. These include bachelor's degrees in Biomedical Sciences, Biotechnology, Biochemistry, Biology and Pharmacy.[1]

The data analysed includes the perspective of stakeholders – alumni and companies and organisations that recruit graduates – on the employability of graduates: surveys on **satisfaction**, **employment outcomes** and **employers' opinions**. In addition, it includes basic data on the analysed qualifications.

The main findings of this report are set out below.

Basic data:

- The number of applications for admission to degrees in the field of Biosciences at public universities exceeds the number of available places by 169.7%. This figure is even higher in the case of Biomedical Sciences (227.4%).

Graduates' satisfaction with their education and employment outcomes:

- Most graduates in the field chose their degree out of personal interest (74.1%), especially in the case of Biomedical Sciences (89.0%).
- The overall satisfaction of graduates in the field is significantly higher than that of the Catalan Higher Education System as a whole: 7.7 vs 7.3 (out of 10). Moreover, 77.7% of the graduates surveyed said they would take their degree again.
- In terms of improving communication, personal and professional skills, graduate satisfaction with the degrees is considerable, on a par with the Catalan Higher Education System overall. Biotechnology graduates and, to a lesser extent, Biology graduates are even more satisfied in this respect.
- Bachelor's degree graduates in the field of Biosciences display a significantly higher level of satisfaction than the Catalan Higher Education System as a whole with respect to external work placements and final-year projects.
- The vast majority of Biosciences graduates (87.3%) were working three years after graduation. However, there is a significant difference between the employment rate of Pharmacy graduates (94.7%) and Biology graduates (79.8%).
- Moreover, among those who were working, 7 out of 10 (71.7%) performed functions specific to their degree. Again, the largest difference is between Pharmacy (89.4%) and Biology (59.4%).

[1] The Genetics and Microbiology degree programmes have been excluded given the small samples available in the data sources used for this analysis.

- Language proficiency and, to a lesser extent, decision-making are the two cross-disciplinary skills that present the greatest educational shortcoming in relation to their usefulness in the workplace, according to graduates who were performing university functions at work. The opposite is true for theoretical and practical knowledge.
- Although the employment quality of graduates in the field of Biosciences is similar to that of the Catalan Higher Education System as a whole, there is a major difference in contractual stability, which is lower in this field (particularly in Biomedical Sciences and Biology).

Employers' opinion:

- When recruiting new staff, among the eighteen fields compared, Biosciences is the field of employment where having a PhD is most important to employers. It is third in terms of the importance of being highly proficient in English and fifth when it comes to having an intermediate or high level of proficiency in other languages.
- Although 39.3% of Biosciences employers struggle to recruit staff, this field is the third least problematic in this respect.
- The lack of graduates with the necessary skills for the job is the main reason for these recruitment difficulties (68% of cases).
- However, Biosciences employers are the third most satisfied with the skills of the recent graduates they have recruited.
- The ability to plan, draft, implement and/or coordinate research, development and innovation projects is the main specific skill that employers believe recruits should improve (59.5% of cases).
- The ability to integrate knowledge in professional and research environments and the ability to organise, analyse and interpret experimental results statistically could also use improvement according to 52.4% and 36.9% of employers, respectively.

INTRODUCTION

The expansion of university systems in Catalonia and elsewhere has intensified the diversification of the functions performed by universities, which have become institutions that go beyond their historical role associated with teaching and research. Today we usually refer to four missions: teaching, research, innovation and service to society (EUROPEAN COMMISSION, 2022). The emergence of the so-called "knowledge society", associated with this expansion, has emphasised the role of universities in the **employability of graduates**, understood not only as obtaining work – which may depend more on the economic situation and employment policies – but also as the capacity of universities to design "training with a profile that responds to the skills and qualifications requested in the labour market" (RODRÍGUEZ ESPINAR et al, 2007, 338).

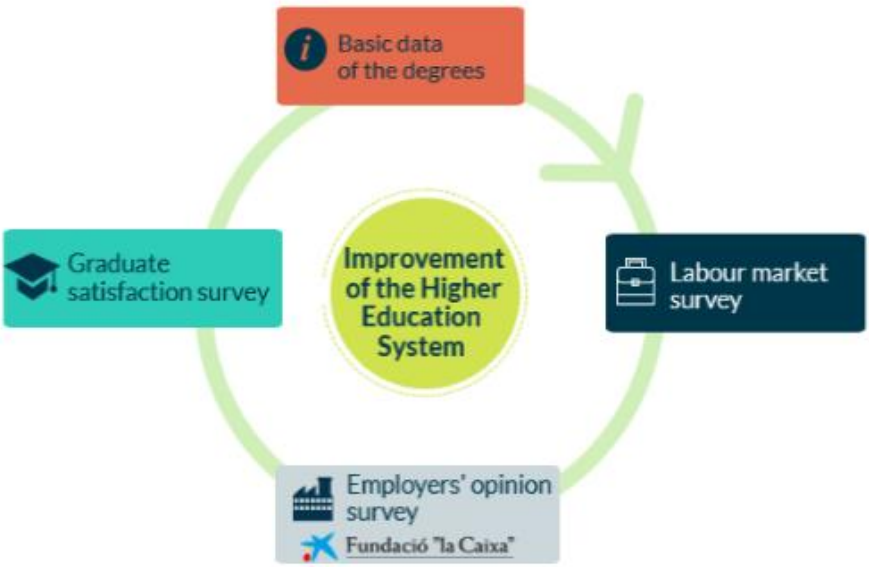
The emphasis on analysing graduate employability profiles also coincides with the emergence of demands for accountability for expansive university systems that require increased public spending. It therefore makes sense for university quality agencies to make available to the university community a set of resources to assess the quality and impact of higher education from an employability perspective (BRENNAN, 2018). In this regard, one of the strategic courses of action of AQU Catalunya that enables this objective to be achieved is that of "facilitating access to quantitative and qualitative data, in an integrated way, to improve the quality of the Catalan Higher Education System" (AQU CATALUNYA, 2022).

This report, which is part of a series of reports on the relationship between university and employability, aims to achieve this objective for degree programmes in the field of Biosciences. A significant proportion of graduates from these degrees may end up working in biomedical research, development and innovation. In recent years, these activities have been key to Catalonia's development of a strong innovation ecosystem in health and life sciences, often referred to as BioRegió.

The document collates the analysis of key data that can be used to understand the functioning of university education from the perspective of employability. The aim is to provide facts that will help those responsible for universities in the political and academic spheres to make decisions aimed at improving university education. Moreover, this knowledge also has the potential to support current and future students in making informed decisions about their career paths.

Figure 1 shows the sources of information included in this analysis.

Figure 1. Sources of information analysed



In addition, this report analyses the results of the latest **employer survey**, which gathers the opinions on university education of companies, organisations and institutions that recruit graduates of degrees in the field of Biosciences. A new feature of this latest survey is the section on the professional skills that have been worked on the most and require the most improvement by **work placement students**.

INDICATORS ON THE DEGREE PROGRAMMES IN THE FIELD OF BIOSCIENCES

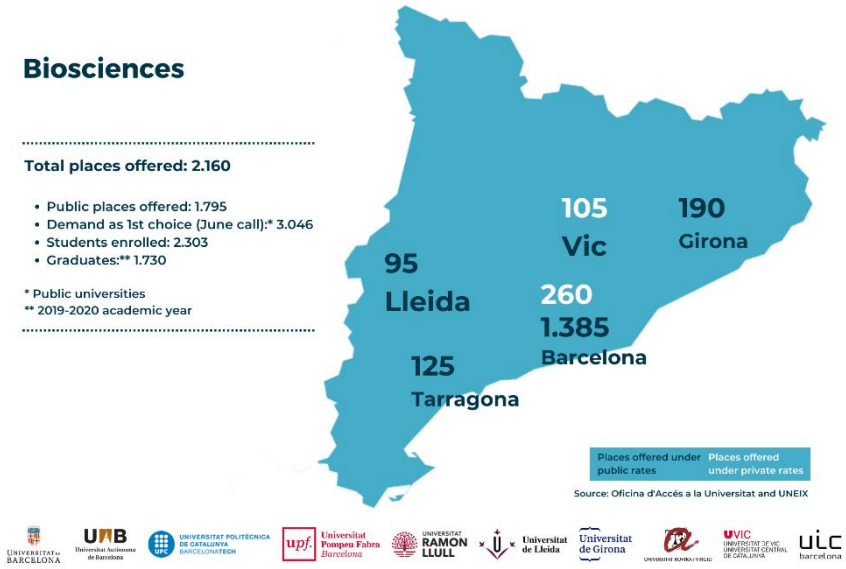
Basic data on the degree programmes

The map and table below display data relating to the number of places available (supply) and the applications received (demand) for bachelor's degrees in the field of Biosciences in Catalonia for the 2021-2022 academic year. In addition, data on three key indicators are shown: the achievement rate, the drop-out rate in the first year[2] and the number of graduates in the academic year 2020-2021.

In the 2021-2022 academic year, the number of applications for Biosciences degrees taught at public universities exceeded the number of places available by 169.7%

> A total of 2,160 places were offered, 1,795 of which were at public universities.

Figure 2. Supply and demand indicators in the field of Biosciences (2021-2022 academic year)[3]



[2] The achievement rate is calculated by dividing the number of credits passed by the number of credits on which students are enrolled, for all the students on a study programme. The first-year drop-out rate shows the percentage of students who do not re-enrol the following year (including those who enrol on another degree programme). For more information, see the glossary on the Estudis Universitaris de Catalunya (EUC) website.

[3] The map shows aggregate data for all the degrees included in the field.

The public supply-demand mismatch is particularly striking in the case of Biomedical Sciences, where demand was 227.4% higher

> Biotechnology degrees have the highest drop-out rate during the first year (7.0%).

Table 1. Supply and demand indicators for bachelor's degrees in the field of Biosciences (2021-2022 academic year)

	Biology	Biochemistry	Biotechnology	Biomedical Sciences	Pharmacy	Total Biosciences
Total number of places offered	445	165	730	405	415	2,160
Public places offered	390	165	575	325	340	1,795
First-option demand (June call)*	603	266	895	739	543	3,046
Total number of new enrolments	480	179	774	436	434	2,303
Demand vs supply (public universities)	154.6%	161.2%	155.7%	227.4%	159.7%	169.7%
Student progress rate**	93.3%	96.2%	92.2%	95.8%	89.4%	-
First-year drop-out rate**	3.9%	5.7%	7.0%	3.7%	3.1%	-
Graduates**	410	163	554	258	357	1,742

*Public universities

**Figures for the 2019-2020 academic year

Satisfaction of graduates with their university education in the field of Biosciences

The data analysed in this section comes from the **satisfaction survey**,[4] an annual survey carried out since 2015 by Catalan universities in coordination with AQU Catalunya. This survey asks recent graduates how satisfied they are with different aspects of their educational experience in the Catalan Higher Education System. The results shown below are drawn from data on the last three available years (2018, 2019 and 2020) for the bachelor's degrees in **Biomedical Sciences**, **Biotechnology**, **Biochemistry**, **Biology** and **Pharmacy**. The overall satisfaction survey response rate in the Catalan Higher Education System for these three years is 26.3%, with some 25,500 responses collected.

Below are the samples of graduates who answered the survey. Figures are provided for each of the Biosciences degrees individually, for the Biosciences field as a whole and for all bachelor's degrees in the Catalan Higher Education System.

Table 2. Population, sample, response rate and sampling error of the satisfaction survey of graduates in the field of Biosciences and in the Catalan Higher Education System (SUC) as a whole (2018-2020)

Programmes	Sample	Population	Response rate	Sampling error (±)
Biology	357	1,154	30.9%	4.3%
Biochemistry	146	456	32.0%	6.7%
Biotechnology	516	1,505	34.3%	3.5%
Biomedical Sciences	326	841	38.8%	4.2%
Pharmacy	321	967	33.2%	4.5%
Total Biosciences	**1,666**	**4,923**	**33.8%**	**2.0%**
Total SUC	**25,484**	**96,892**	**26.3%**	**0.5%**

This section explores data on satisfaction with the aspects of university education that are most relevant for the employability of graduates in the field of Biosciences. A summary of the overall satisfaction of graduates from these degrees is also provided.

In addition, this section analyses a question from the satisfaction survey that is closely linked to the subject of this report, namely the question about the respondents' main motivation for choosing their degree. This, in conjunction with the data from the employment outcomes survey and the employer survey, allows us construct a complete profile of students and recent graduates in the field of Biosciences.

[4] <https://www.aqu.cat/en/Studies/Surveys-and-thematic-studies/Bachelor-and-Master-s-graduate-satisfaction-survey>

Motivation for choosing degrees in the field of Biosciences and overall satisfaction with these degrees

Nearly 3 out of 4 students in the field of Biosciences (74.1%) choose their degree out of personal interest

- This figure is particularly notable among Biochemistry students[5] (80.6%) and even more so among Biomedical Sciences students (89.0%).
- It is much lower, however, in the case of Pharmacy, where 53.1% of students choose their degree out of personal interest. Meanwhile, good career prospects are the main reason for choosing this degree for 29.6% of students. In the case of Biotechnology, good career prospects also carry an important weight as a reason for choosing the bachelor's degree (13.2%).
- Finally, the cut-off mark is an important reason why Biology students choose their degree (14.1% of cases).

Table 3. Main reasons why students chose their respective degrees (%)

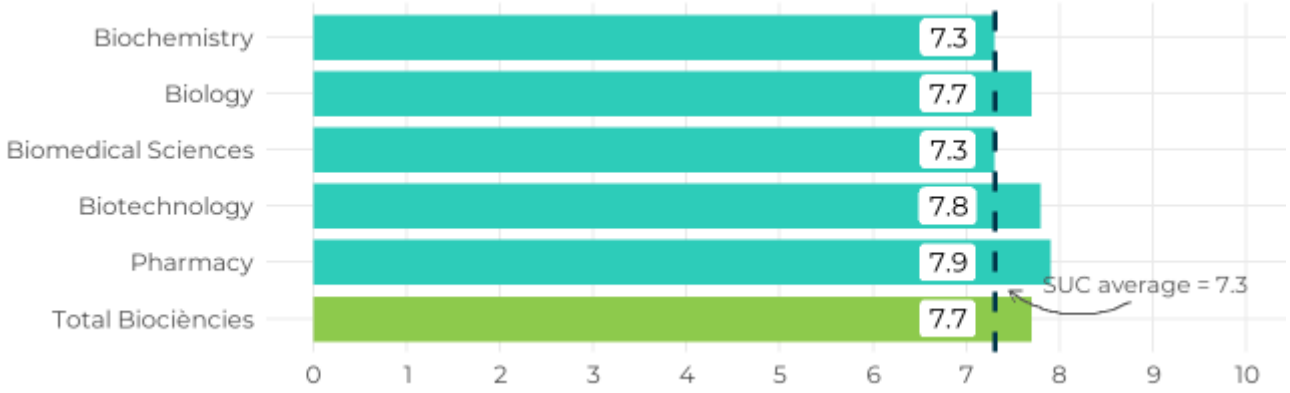
Programmes	Personal interest	Good career prospects	Cut-off mark	Other
Biology	79.5%	0.9%	14.1%	5.5%
Biochemistry	80.6%	3.5%	7.6%	8.3%
Biotechnology	73.0%	13.2%	9.5%	4.3%
Biomedical Sciences	89.0%	1.5%	4.5%	5.0%
Pharmacy	53.1%	29.6%	8.8%	8.5%
Total Biosciences	**74.1%**	**10.9%**	**9.1%**	**5.8%**
Total SUC	**73.1%**	**13.7%**	**5.4%**	**7.8%**

[5]To check whether the differences between the degree programmes analysed and the SUC as a whole are statistically significant, a tool developed by AQU Catalunya was used to carry out 1,000 simulations using the bootstrap method for simple random sampling with replacement in the scenario of infinite populations (EFRON, TIBSHIRANI, 1993), thus obtaining a distribution of the 1,000 simulated differences between the two groups. Where no specific reference is made, the technique used to highlight a result is therefore bootstrapping; in other cases, the relevant statistical method will be specified.

Overall degree satisfaction among Biosciences graduates is 7.7, higher than for the Catalan Higher Education System as a whole (7.3)

- Pharmacy (7.9), Biotechnology (7.8) and Biology (7.7) are the most highly rated degrees in this respect.
- Biomedical Sciences (7.3) and Biochemistry (7.3) also receive a high score, but it is equivalent to the overall Catalan Higher Education System average.

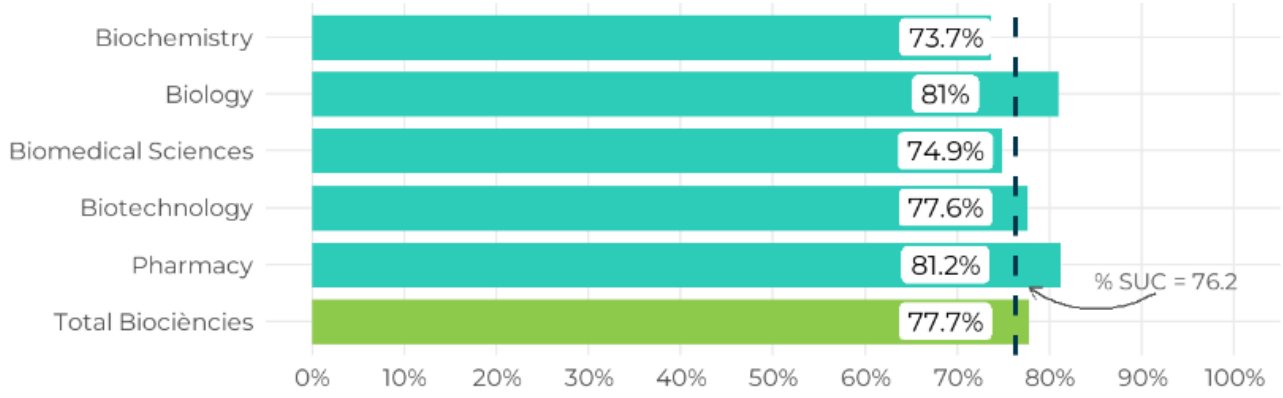
Figure 3. Overall satisfaction with bachelor's degrees in the field of Biosciences



Approximately 3 out of 4 Biosciences graduates (77.7%) would take their degree again

- The percentage of graduates who would take their degree again exceeds 80% in Pharmacy (81.2%) and Biology (81%).
- In contrast to overall satisfaction, Biotechnology comes in close to the Catalan Higher Education System average in this regard (77.6% vs 76.2%).
- Biomedical Sciences (74.9%) and Biochemistry (73.7%) fall slightly short of the overall average (76.2%), although these figures are statistically equivalent.

Figure 4. Percentage of graduates who would take their degree in the field of Biosciences again



Satisfaction with the skills acquired, the external work placements and the bachelor's degree final-year project

Biosciences graduates are considerably satisfied with how their degrees improved their communication, personal and professional skills

- All three types of skills received higher scores among Biotechnology graduates.
- Biology graduates also stand out in terms of improving their communication skills (7.4) and personal skills (7.5), but not professional skills (7.1).
- Among Biochemistry and Biomedical Sciences graduates, the scores for all three types of skills are equivalent to those of the overall Biosciences average.
- Although still satisfactory, Pharmacy graduates gave the lowest scores to their degrees in terms of improving their communication skills (6.0) and personal skills (6.5).

Table 4. Degree to which the education received improved certain skills, according to graduates in the field of Biosciences

Programmes	Communication skills	Personal skills	Professional skills
Biology	7.4	7.5	7.1
Biochemistry	6.9	7.0	6.9
Biotechnology	7.3	7.4	7.5
Biomedical Sciences	7.2	6.9	7.2
Pharmacy	6.0	6.5	7.2
Total Biosciences	**7.0**	**7.1**	**7.2**
Total SUC	**7.0**	**7.2**	**7.1**

Biosciences graduates are more satisfied with both the final-year projects and external work placements than graduates in the Catalan Higher Education System as a whole

- Satisfaction with the final-year projects and external work placements is higher among Biomedical Sciences, Biotechnology and Biology graduates.
- Biochemistry graduates are also highly satisfied with the external work placements, whereas their satisfaction with the final-year projects is close to the average.
- Meanwhile, the satisfaction of recent Pharmacy graduates with both aspects is equivalent to that of the Catalan Higher Education System as a whole.

Table 5. Biosciences graduates' satisfaction with the external work placements and final-year projects

Programmes	External work placements	Bachelor's Degree Final-year Project
Biology	7.4	7.7
Biochemistry	7.6	6.9
Biotechnology	7.5	7.7
Biomedical Sciences	7.9	7.7
Pharmacy	7.0	6.7
Total Biosciences	**7.5**	**7.4**
Total SUC	**6.9**	**6.7**

Employment outcomes of graduates in the field of Biosciences

The data analysed in this section comes from the **employment outcomes survey**, an annual survey carried out since 2001 by Catalan universities in coordination with AQU Catalunya. This survey asks about factors related to the employment activity of graduates and the quality of that employment activity (job suitability, contractual stability, earnings, etc.). The results shown below[6] are drawn from data from the latest survey, the fieldwork for which was carried out in 2020, surveying people who graduated from a bachelor's degree in the field of **Biosciences** in the 2015-2016 academic year.

Below are the samples of graduates who answered the survey. Figures are provided for each of the Biosciences degrees individually, for the Biosciences field as a whole and for all bachelor's degrees in the Catalan Higher Education System.

Table 6. Population, sample, response rate and sampling error of the employment outcomes survey of graduates in the field of Biosciences and in the Catalan Higher Education System as a whole (2020)

Programmes	Sample	Population	Response rate	Sampling error (±)
Biology	184	388	47.4%	6.5%
Biochemistry	87	160	54.4%	7.1%
Biotechnology	199	403	49.4%	4.9%
Biomedical Sciences	129	254	50.8%	6.1%
Pharmacy	151	355	42.5%	6.1%
Total Biosciences	**750**	**1,560**	**48.1%**	**2.6%**
Total SUC	**13,902**	**30,084**	**46.2%**	**0.6%**

[6] In traditional universities. The data presented in this report are weighted according to stratified sampling by degree and sampling unit.

In 2020, almost 9 out of 10 Biosciences graduates (87.3%) were working three years after graduation

- This proportion is even higher among Pharmacy graduates (94.7%).
- The employment rate of graduates in Biochemistry (90.6%) and Biomedical Sciences (89.6%) is also very high but similar to that of the Catalan Higher Education System (90.2%).
- In contrast, the employment rate is lower among Biotechnology graduates (85.3%) and even more so among Biology (79.8%) graduates.

Figure 5. Trend in the employment rate of Biosciences graduates
(the year indicates when they responded to the survey, i.e. three years after graduation)

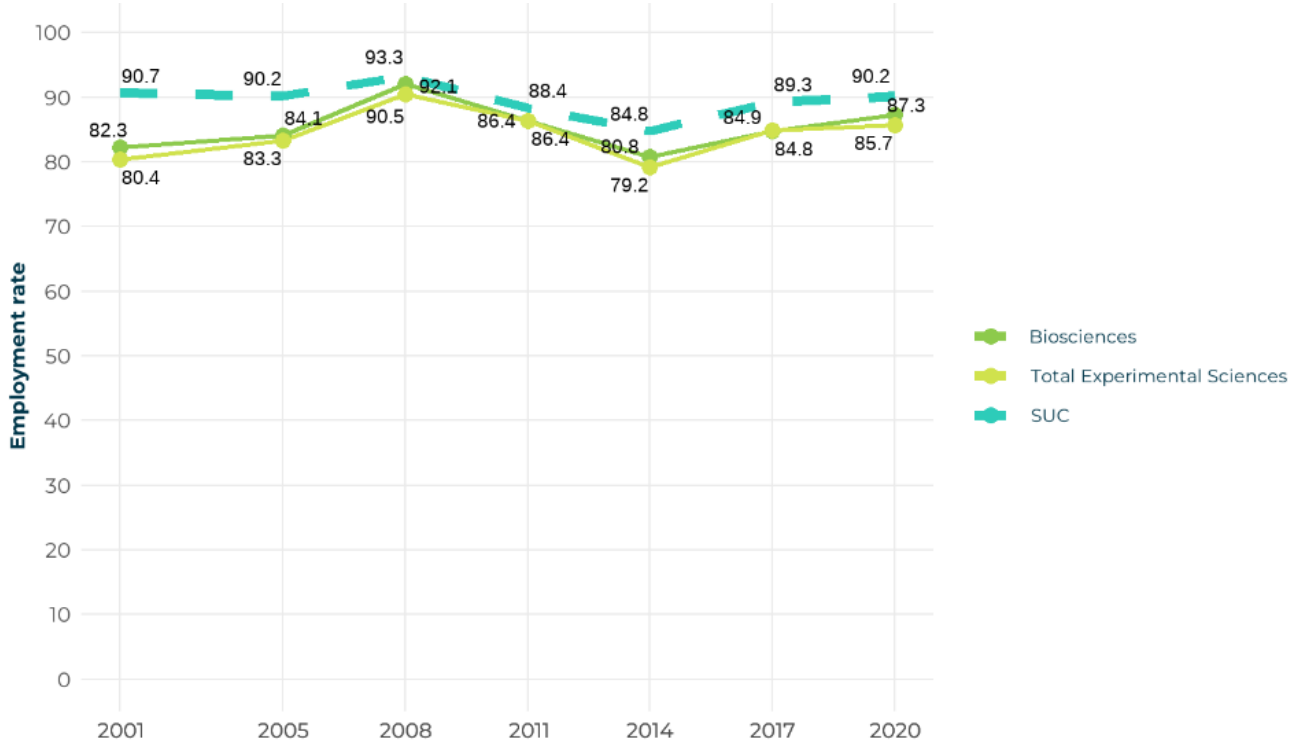
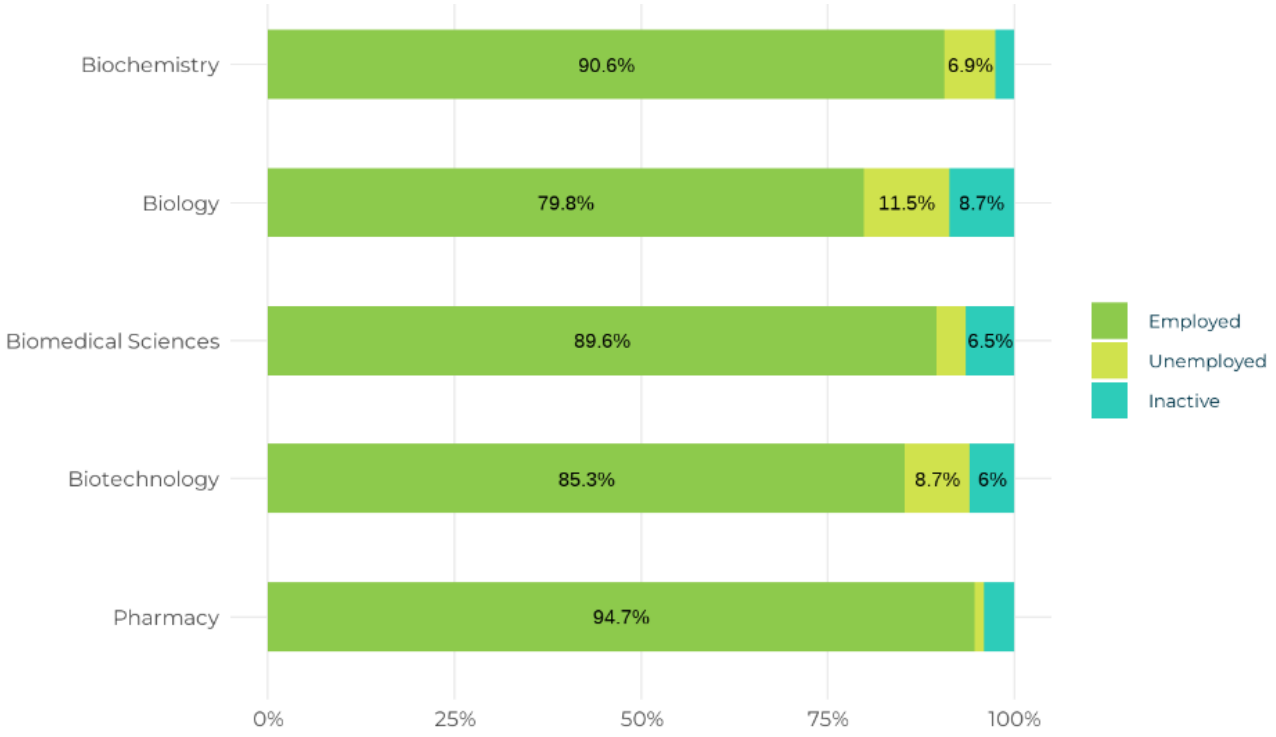


Figure 6. Employment rate of Biosciences graduates, by degree (2020)



Approximately 7 out of 10 Biosciences graduates (71.7%) perform job functions that are specific to their degree

- Pharmacy is the degree with the highest proportion of graduates performing degree-specific functions (89.4%).
- Biomedical Sciences (74.2%), Biochemistry (71.3%) and, to a lesser extent, Biotechnology (66.1%) are near the Catalan Higher Education System average (75%).
- Meanwhile, Biology has the lowest percentage of graduates performing degree-specific functions (59.4%).

Figure 7. Percentage of graduates who perform functions specific to their degree in the field of Biosciences
(the year indicates when they responded to the survey, i.e. three years after graduation)

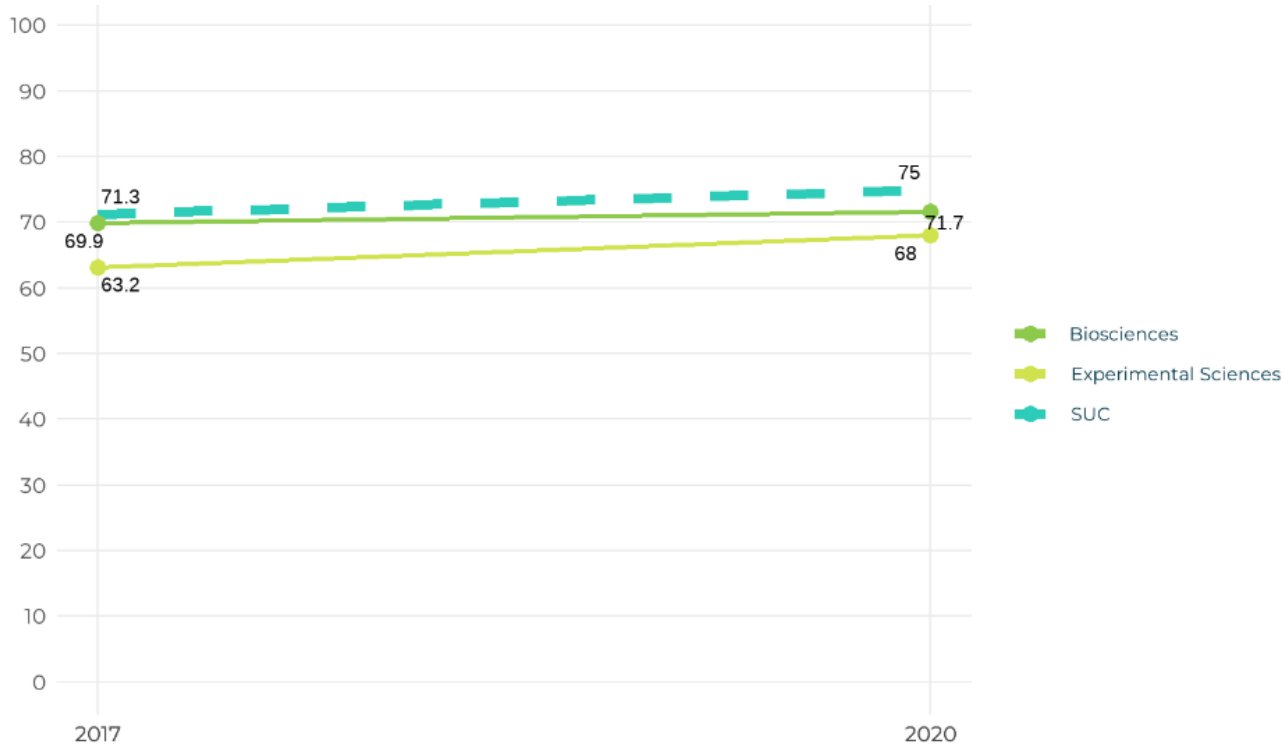
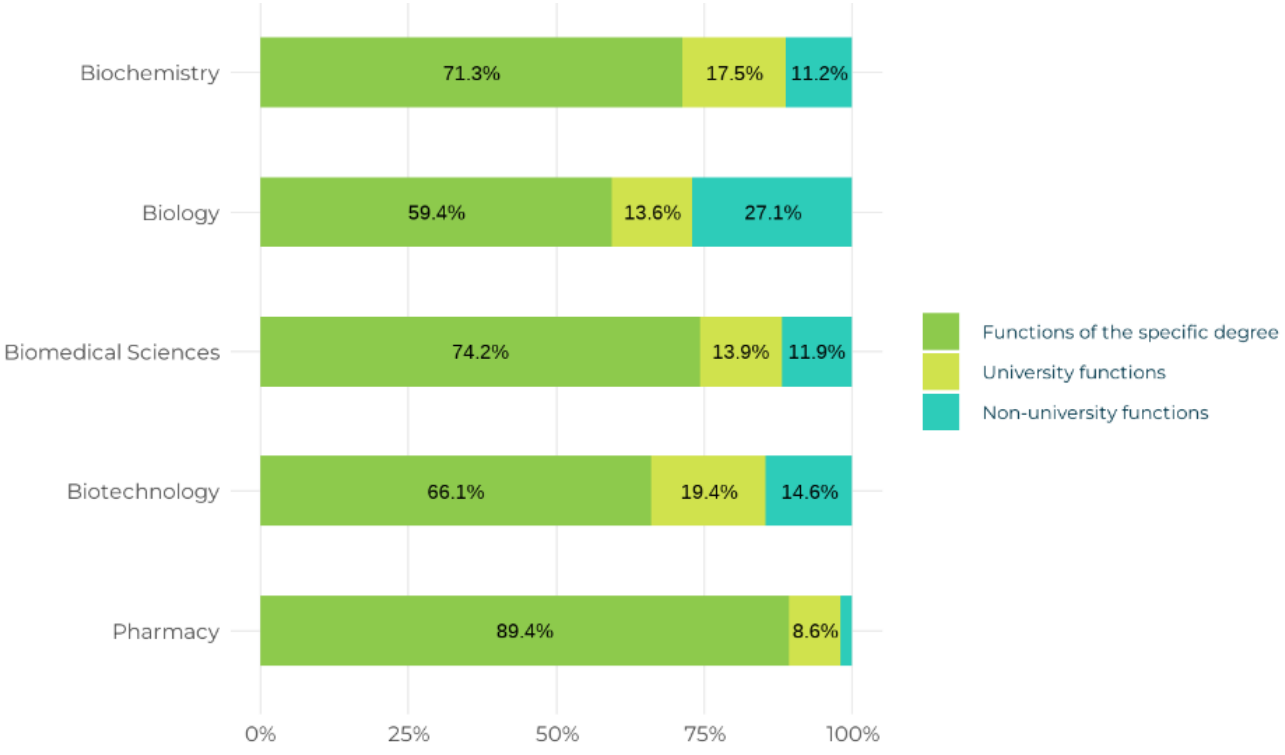


Figure 8. Types of functions (as percentages) performed by graduates in the field of Biosciences, by degree (2020)

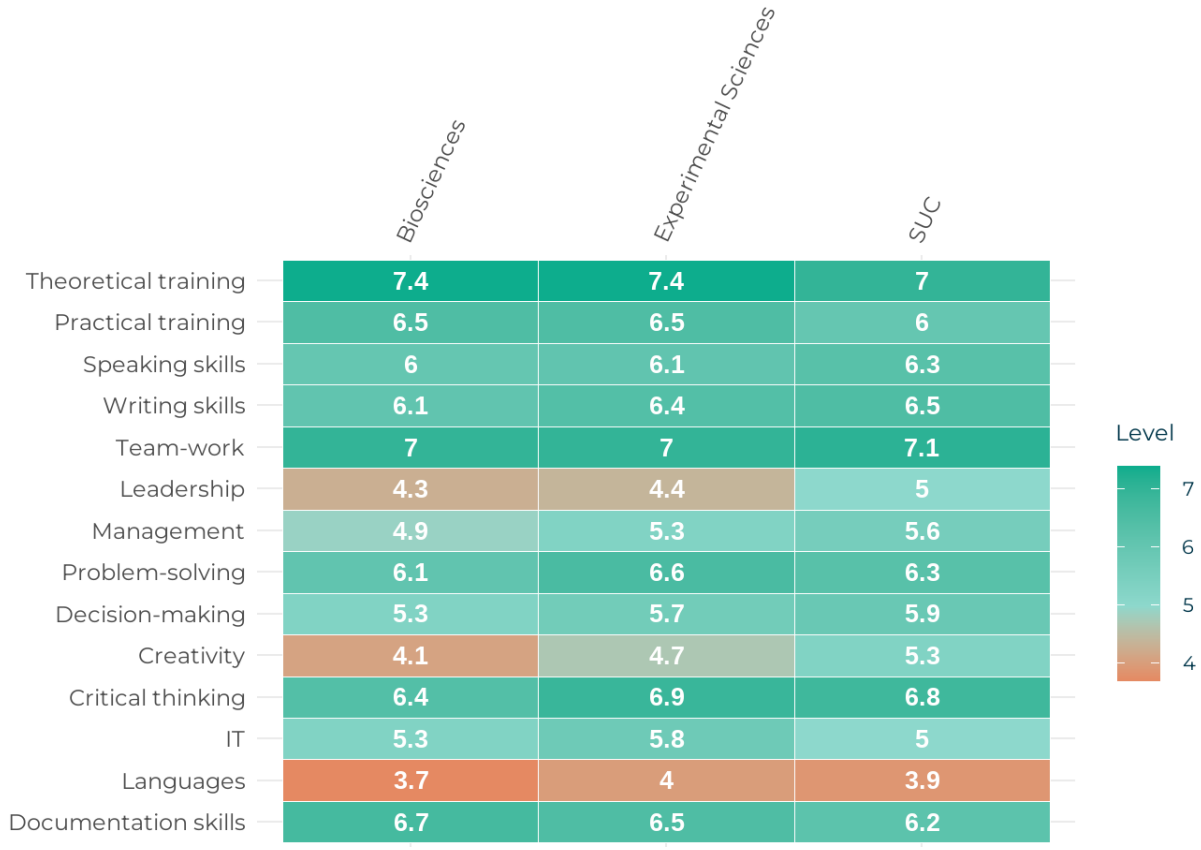


Acquisition of skills on the degree course and their usefulness for work

Theoretical knowledge is the most highly acquired skill according to Biosciences graduates, while language proficiency falls at the opposite end

- However, practical knowledge and documentation skills score the highest with respect to the Catalan Higher Education System total (+0.5 in both cases).[7]
- Meanwhile, creativity shows the greatest negative score difference with respect to the Catalan Higher Education System average (4.1 vs 5.3). The situation is similar for leadership, management and decision-making.

Figure 9. Graduates' rating of the education they received, by skill, in 2020 (from 0 to 10)

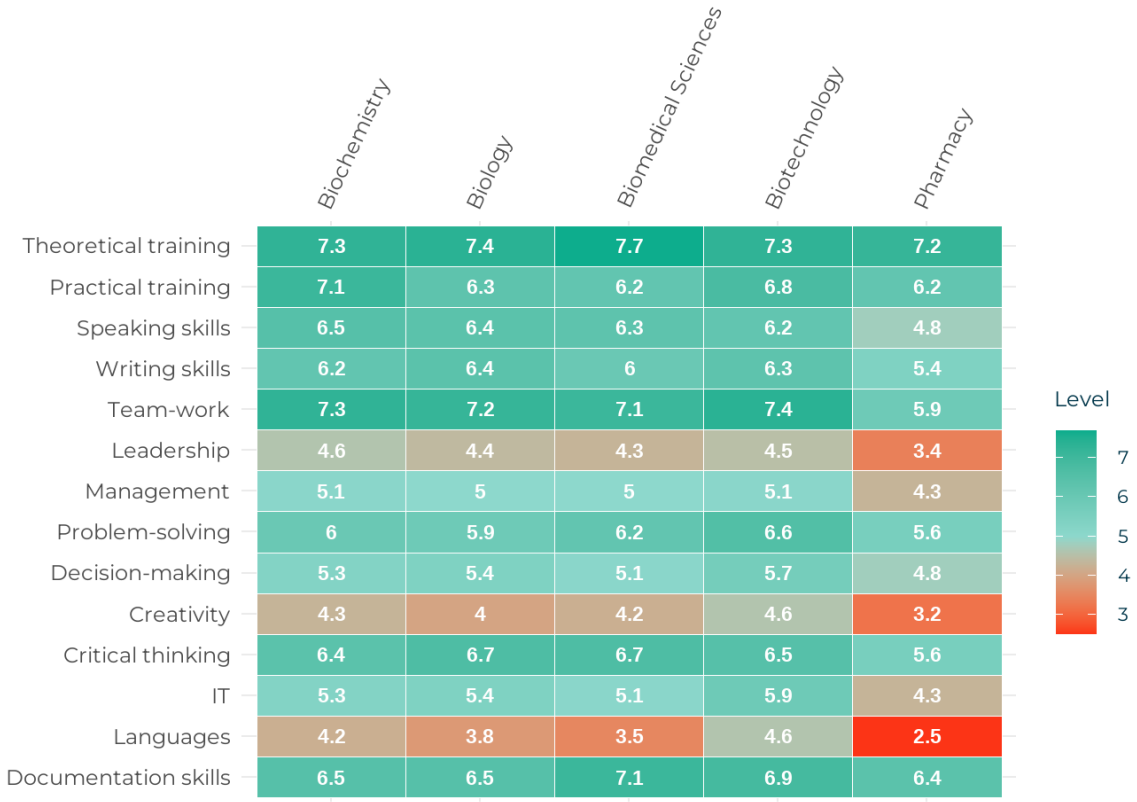


[7] For example, practical knowledge comes in at 6.5 for Biosciences graduates and 6.0 for the Catalan Higher Education System as a whole, the difference therefore being +0.5.

Among the graduates in this field, those in Biomedical Sciences have rated the theoretical knowledge they acquired on their degree the highest

> It is among Biotechnology graduates where the scores for this list of skills are generally higher than the Catalan Higher Education System as a whole. The opposite is true for the scores given by Pharmacy graduates.

Figure 10. Graduates' rating of the education they received, by skill and degree, in 2020 (from 0 to 10)



Language proficiency is the skill that graduates underline as the main shortcoming in their education with respect to its usefulness for work

- Decision-making, leadership and creativity are next in terms of the difference between the education received by graduates to improve these skills and their workplace usefulness.
- Contrarily, theoretical knowledge received a higher score for the education received than for its usefulness at work. This is also the case, albeit to a lesser extent, with practical knowledge.

Figure 11. Difference between the education provided and its usefulness for work, by skill, in 2020 (from 0 to 10)[8]

Scores equal to or less than -2.0 are highlighted in red; scores from -1.9 to -1.0 are highlighted in yellow; and scores greater than -1.0 are highlighted in green.

	Biosciences	Experimental Sciences	SUC
Theoretical training	1.4	1.2	1
Practical training	0.9	0.7	0.1
Speaking skills	-0.6	-0.6	-0.4
Writing skills	-0.4	-0.4	-0.3
Team-work	-0.5	-0.5	-0.4
Leadership	-1.4	-1.3	-1
Management	-1.3	-1.1	-0.8
Problem-solving	-1.1	-0.7	-0.8
Decision-making	-1.5	-1.3	-1.1
Creativity	-1.4	-1.1	-0.7
Critical thinking	-1.1	-0.7	-0.5
IT	-1	-0.9	-1.1
Languages	-2.5	-2.3	-1.7
Documentation skills	-0.5	-0.5	-0.3

[8] The table shows the difference between the education provided to work on each skill and the usefulness of the skill for work, according to graduates. Therefore, a negative score means that the usefulness of a skill is greater than the education provided to work on it, which indicates an educational shortcoming. For example, if graduates rate the education provided for language proficiency at 5.5 and the usefulness of this skill for work at 8, the result is an educational shortcoming of -2.5.

The results are shown for graduates who perform university functions in their jobs.

In terms of language proficiency, the greatest difference between graduates' rating of the education provided and the skill's usefulness for work is in Biomedical Sciences

- The most prominent shortcoming with respect to decision-making is also reported by Biomedical Sciences graduates.
- The highest score for theoretical knowledge in relation to its workplace usefulness is given by Pharmacy and Biology graduates.

Figure 12. Difference between the education provided and its usefulness for work, by skill and degree, in 2020 (from 0 to 10)

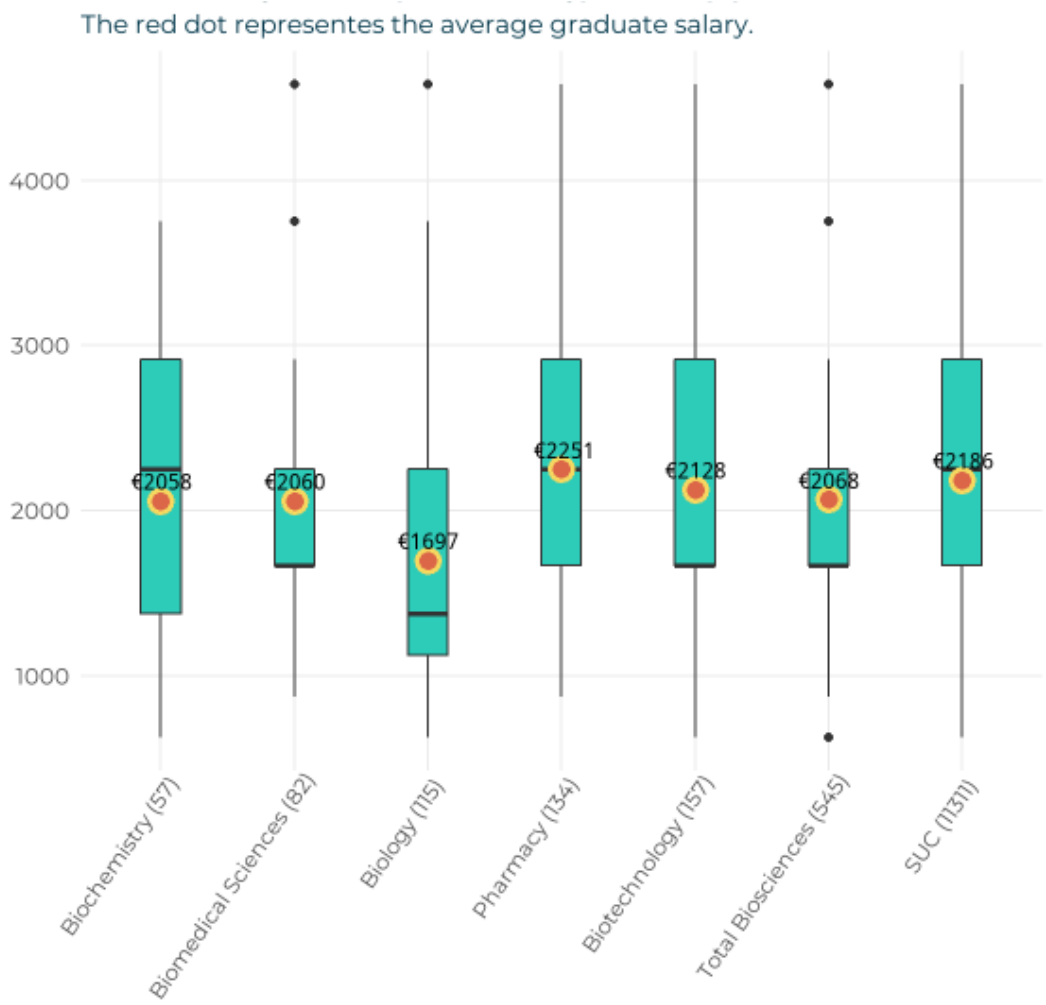
Scores equal to or less than -2.0 are highlighted in red; scores from -1.9 to -1.0 are highlighted in yellow; and scores greater than -1.0 are highlighted in green.

	Biochemistry	Biology	Biomedical Sciences	Biotechnology	Pharmacy
Theoretical training	0.8	1.5	1.3	1.2	1.7
Practical training	0.8	1	1.1	0.7	1
Speaking skills	-0.6	-0.2	-1	-0.6	-0.7
Writing skills	-0.2	-0.3	-0.8	-0.4	-0.1
Team-work	-0.5	-0.1	-1	-0.3	-0.7
Leadership	-1.1	-1	-1.8	-1.5	-1.6
Management	-1.1	-0.9	-1.4	-1.5	-1.5
Problem-solving	-1.2	-1	-1.5	-0.9	-1.1
Decision-making	-1.3	-1.1	-2.1	-1.5	-1.6
Creativity	-1.6	-1.4	-1.6	-1.2	-1.4
Critical thinking	-1.4	-0.5	-1.5	-1.1	-1
IT	-1.4	-0.7	-1.5	-0.7	-1.1
Languages	-2.5	-2.1	-3.4	-2.1	-2.6
Documentation skills	-1.1	-0.3	-1	-0.2	-0.1

The gross monthly salary of graduates in the field of Biosciences is €2,068, significantly lower than the Catalan Higher Education System average (€2,186)

- This difference is mainly due to the weight of Biology graduates, whose income is the lowest (€1,697).
- In contrast, Pharmacy graduates earn a much higher gross monthly salary (€2,251) than those with other degrees in the field.

Figure 13. Distribution of gross monthly salaries (€) of Biosciences graduates (2020)



The percentage of permanent contracts is lower in the field of Biosciences (44.4%) than in the Catalan Higher Education System as a whole (56.3%)

> This disparity is particularly pronounced among Biomedical Sciences (29.8%) and Biology (31.1%) graduates.

> Pharmacy graduates enjoy the highest contractual stability, with 63.3% employed on permanent contracts.

Figure 14. Contract type of graduates in the field of Biosciences (2020)

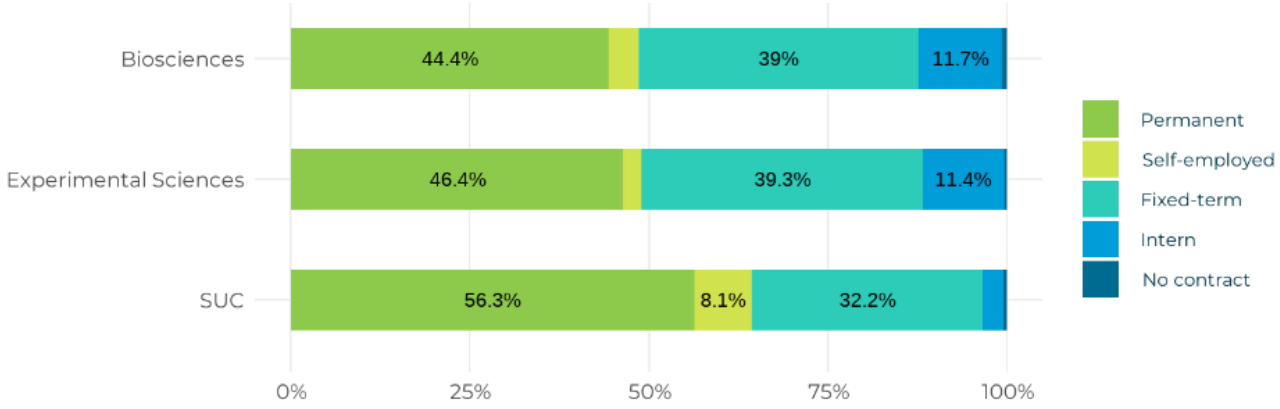
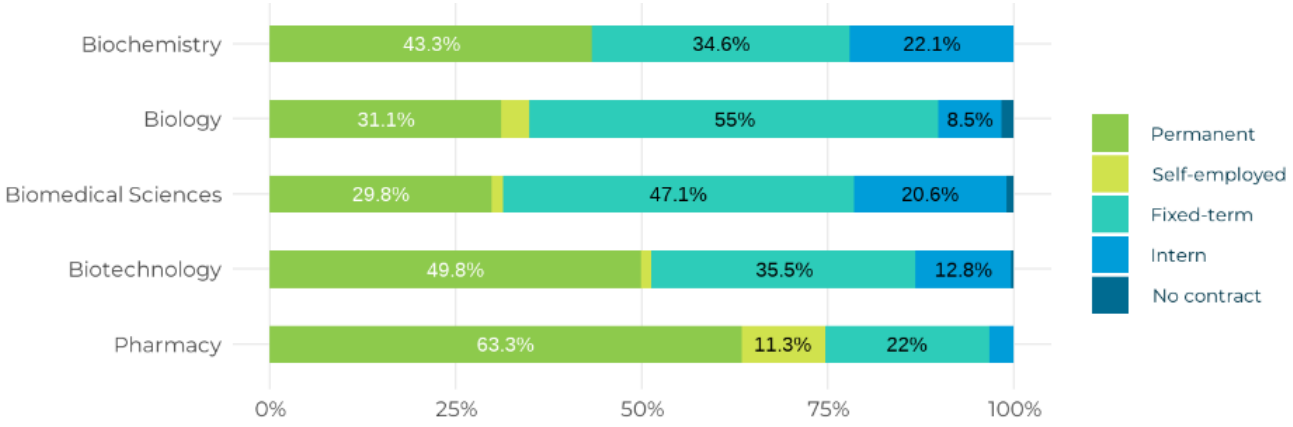


Figure 15. Contract type of graduates in the field of Biosciences, by degree (2020)

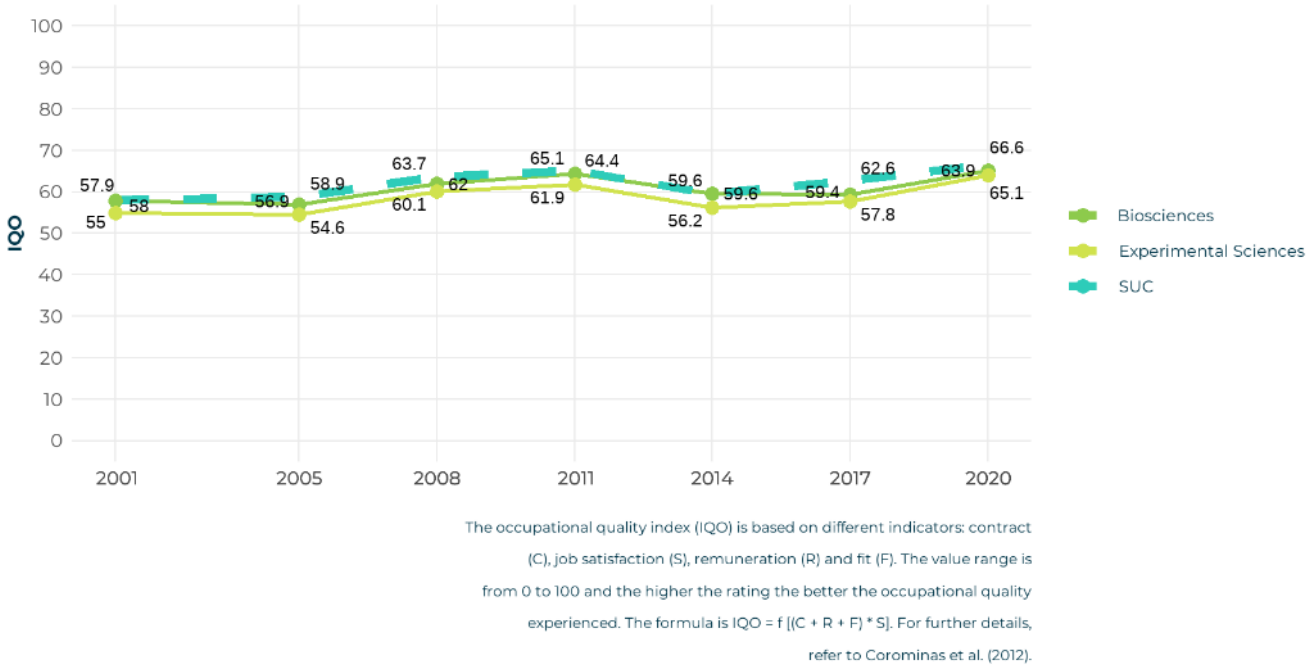


The overall quality of employment in the field of Biosciences is similar to that of the Catalan Higher Education System as a whole

> However, this quality is much higher among Pharmacy graduates.

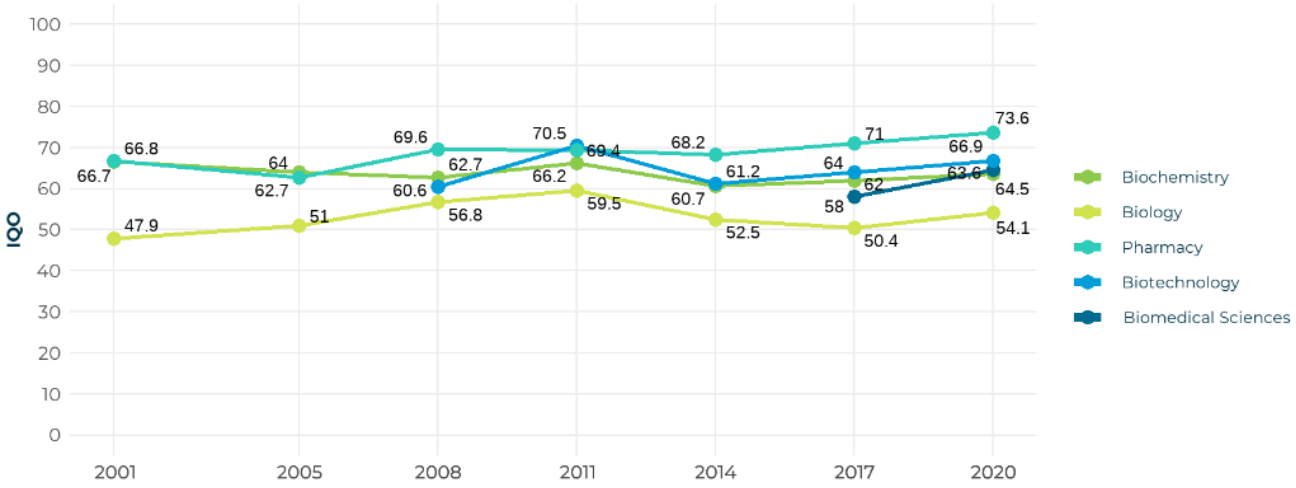
> Conversely, graduates in Biomedical Sciences and Biology fall well below the overall average in this respect.

Figure 16. Trend in the occupational quality index (OQI) for graduates in the field of Biosciences (from 0 to 100)



The occupational quality index (IQO) is based on different indicators: contract (C), job satisfaction (S), remuneration (R) and fit (F). The value range is from 0 to 100 and the higher the rating the better the occupational quality experienced. The formula is IQO = f [(C + R + F) * S]. For further details, refer to Corominas et al. (2012).

Figure 17. Trend in the occupational quality index (OQI) for graduates in the field of Biosciences, by degree (from 0 to 100)



The occupational quality index (IQO) is based on different indicators: contract (C), job satisfaction (S), remuneration (R) and fit (F). The value range is from 0 to 100 and the higher the rating the better the occupational quality experienced. The formula is IQO = f [(C + R + F) * S]. For further details, refer to Corominas et al. (2012).

The opinion of employers regarding the education received by graduates in the field of Biosciences

Scope and methodology of the employer survey

This section contains the results of the third edition of the **employer survey**, a three-yearly survey carried out by AQU Catalunya to find out the opinion of companies and organisations based in Catalonia (hereinafter, employers) as to whether university education responds to their needs. The ultimate aim of the study is to provide the university system with information that will enable it to assess whether the educational offer needs to be adapted to the needs of the labour market. New to this edition of the employer survey is a question about the skills of work placement students.

The questions upon which the study is based are as follows:

- How satisfied are employers with the training of **recent graduates**?[9]
- How satisfied are employers with the education received by **work placement students**?
- What factors explain the difficulties employers face when recruiting?
- Which competences should be improved?

The fieldwork was carried out through the sending of mass e-mails between May and July 2021 to employers that have signed an internship agreement with the SUC universities and/or appear in their job banks. We assume that this list of employers (*n* = 29,865) constitutes the universe of the graduate labour market in Catalonia. We also enlisted the help of professional associations and chambers of commerce to disseminate the questionnaire. In the end, a total of **2,423 employers** responded to the survey, of which **1,729** had recruited recent graduates and/or taken on work placement students. Of these companies, **90** responded that they had recruited recent graduates and **94** that they had taken on work placement students.

In terms of methodology, there are a number of aspects to be taken into account when conducting employer surveys.

First of all, it is difficult to access this population pool. In particular, it is difficult to obtain a well-defined universe of employers with associated contact details. Indeed, it is common in the literature to find that university employer databases are used as a sampling frame of graduate employers (Byrne, 2022).

Secondly, employer surveys – and online surveys in general – tend to have a low response rate (Byrne, 2022; Manfreda et al., 2008).

Finally, it is important to note that numerous methodological studies – both quantitative and qualitative – highlight that, although the results of a survey with relatively few responses should be

[9] In the employer survey, we define "recent graduate" as a person who has completed their studies in the two years prior to receiving the survey and who has little or no professional experience. We limit the definition of a recent graduate because we want to ascertain the opinion of the employers on the **skills acquired at university**.

treated with caution, a low response rate does not mean that the sample is unrepresentative (GROVES, 2006; METERKO et al., 2015).

Below are the results of the third edition of the employer survey. Firstly, we describe the factors and difficulties faced by employers when recruiting; secondly, we detail the skills that employers believe graduates should improve; thirdly, we look at the skills that have been worked on the most during the work placement period and those that work placement students need to improve the most; and finally, we go over the skills that will be most relevant in the future in the field of Biosciences according to the participating employers.

Number of employers that responded to the survey

Table 7. Number of responses from employers that recruit graduates and take on work placement students from the field of Biosciences

Programmes	*No. who hire*	*% of the total number of responses*	*No. taking on students*	*% of the total number of responses*
Biology	32	35.6%	38	40.4%
Biotechnology	21	23.3%	29	30.9%
Pharmacy	13	14.4%	8	8.5%
Biochemistry	12	13.3%	6	6.4%
Biomedical Sciences	12	13.3%	13	13.8%
Total Biosciences	**90**	**100%**	**94**	**100%**

Factors and difficulties when recruiting graduates

Biosciences is the field of employment, among the eighteen fields analysed, where having a PhD is most important to employers when it comes to recruiting graduates

> Of the employers who answered the survey, 25% say that having a PhD was an important factor in the selection process. The overall average in this regard is 6.3%.

Figure 18. Important factors when considering a graduate from the field of Biosciences as a job candidate

In the selection process for recent graduates, was it important that they had a university degree?

Response	n	Percentage
Yes, a specific bachelor's degree	85	94
Yes, any bachelor's degree	3	3
No	2	2

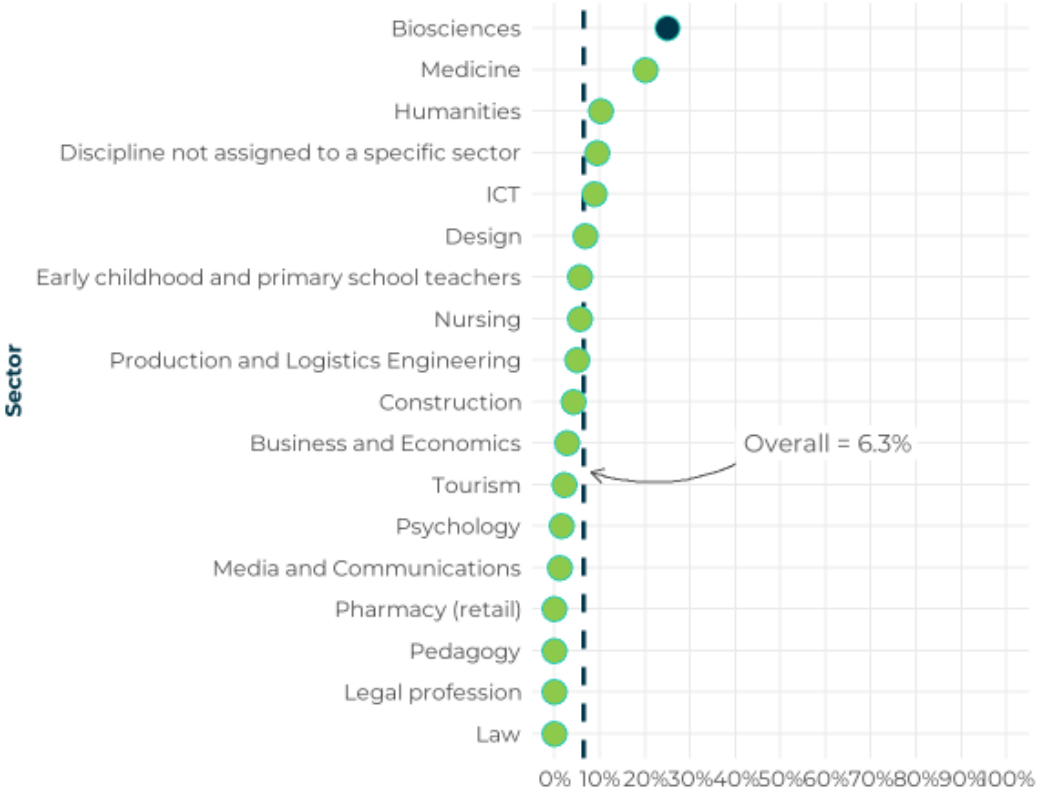
In the selection process for recent graduates, was it important that they had a master's degree?

Response	n	Percentage
Yes, a specific master's degree	49	55
Yes, any master's degree	3	3
No	37	42

In the selection process for recent graduates, was it important that they had a doctorate?

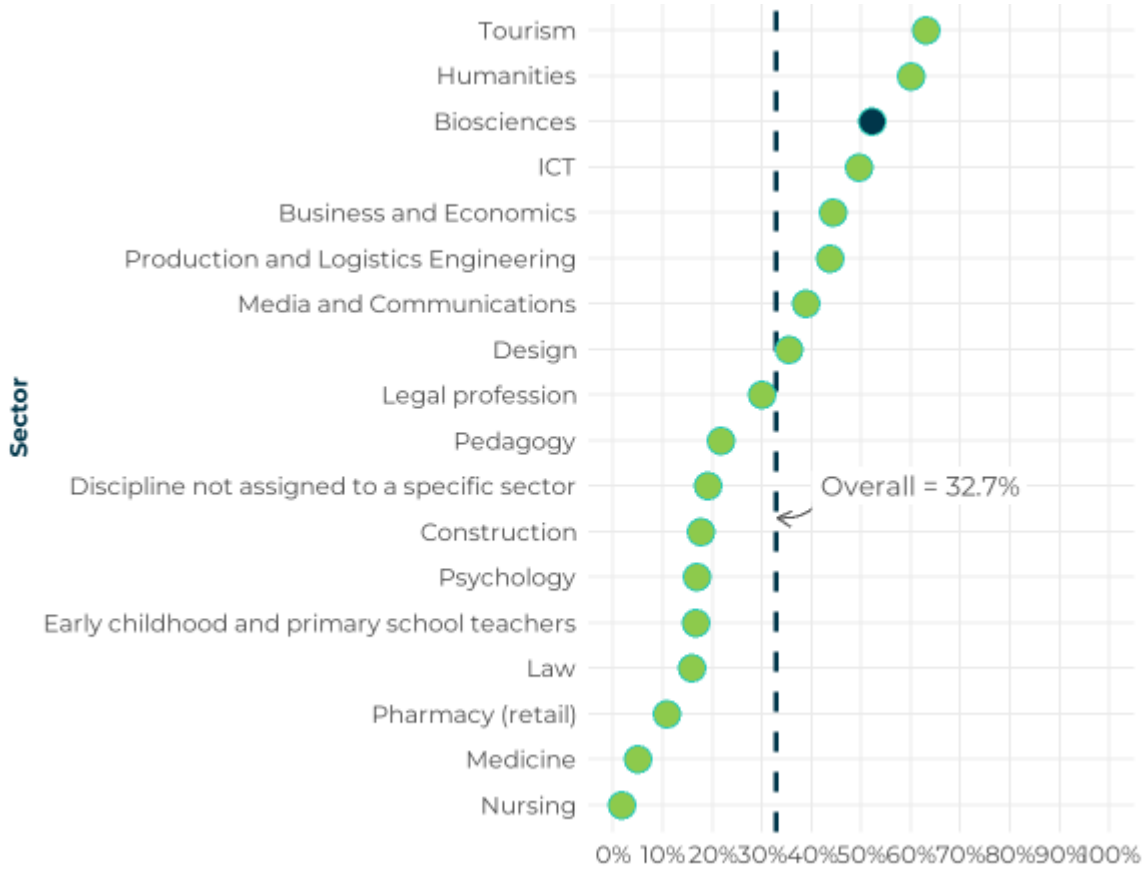
Response	n	Percentage
Yes, it was important	22	25
No, it was not important	67	75

Figure 19. Comparison of employers who require a PhD, by field included in the employer survey



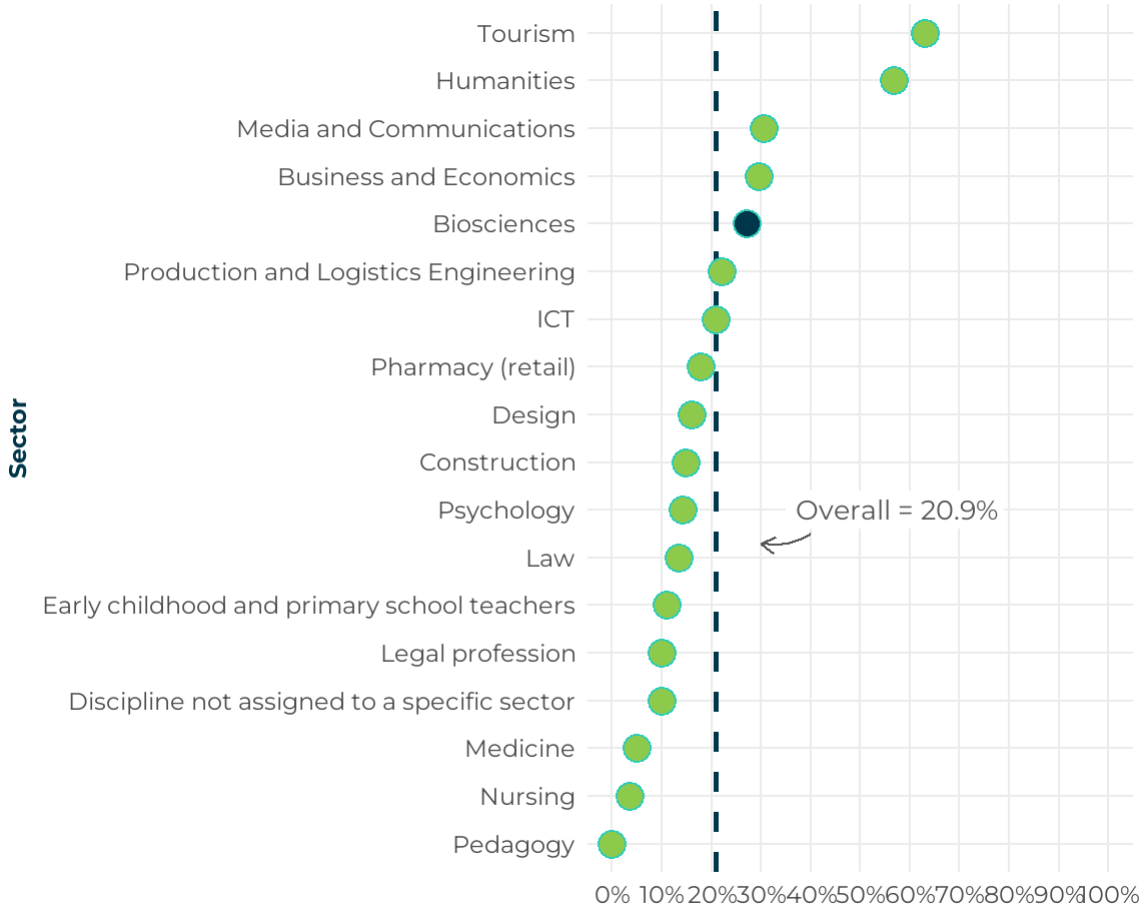
Biosciences ranks third among the eighteen fields analysed in terms of requiring a high level of English proficiency (53% of employers)

Figure 20. Comparison of employers who require a high level of English proficiency, by field included in the employer survey



Nearly 3 out of 10 employers (27%) also ask for an intermediate or high level of proficiency in foreign languages other than English, which places Biosciences fifth in this respect

Figure 21. Comparison of employers who require an intermediate or high level of proficiency in foreign languages (other than English), by field included in the employer survey



Around 4 out of 10 employers (39.3%) say they struggle to recruit Biosciences professionals

- However, this field is the third least problematic in this respect among the eighteen compared, coming in at 14.7 percentage points below the average.
- Recruitment difficulties are more pronounced for Pharmacy (61.5%) and Biomedical Sciences (54.5%).
- Meanwhile, this problem is less significant (25%) for Biochemistry.

Figure 22. Comparison of employers who face difficulties when recruiting, by field included in the employer survey

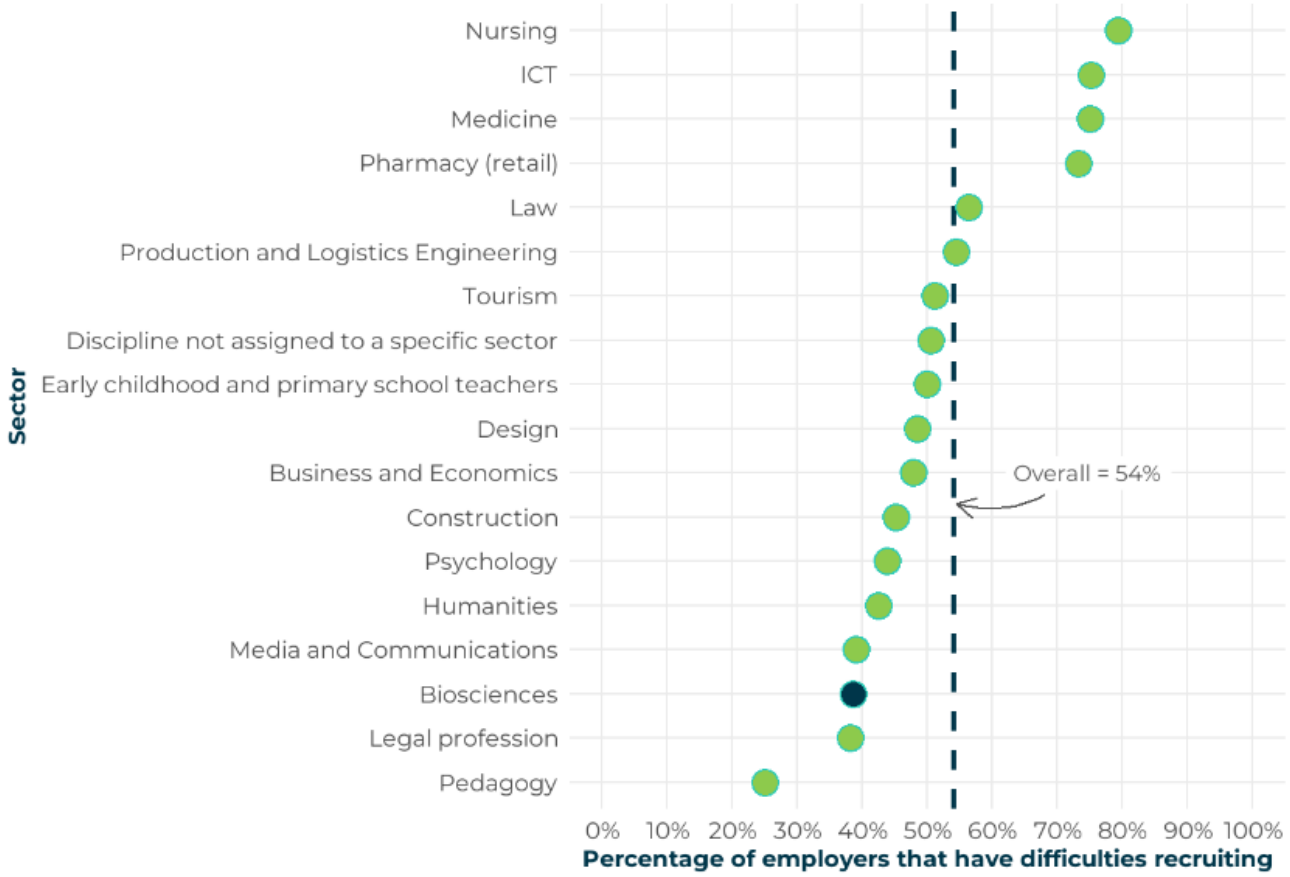
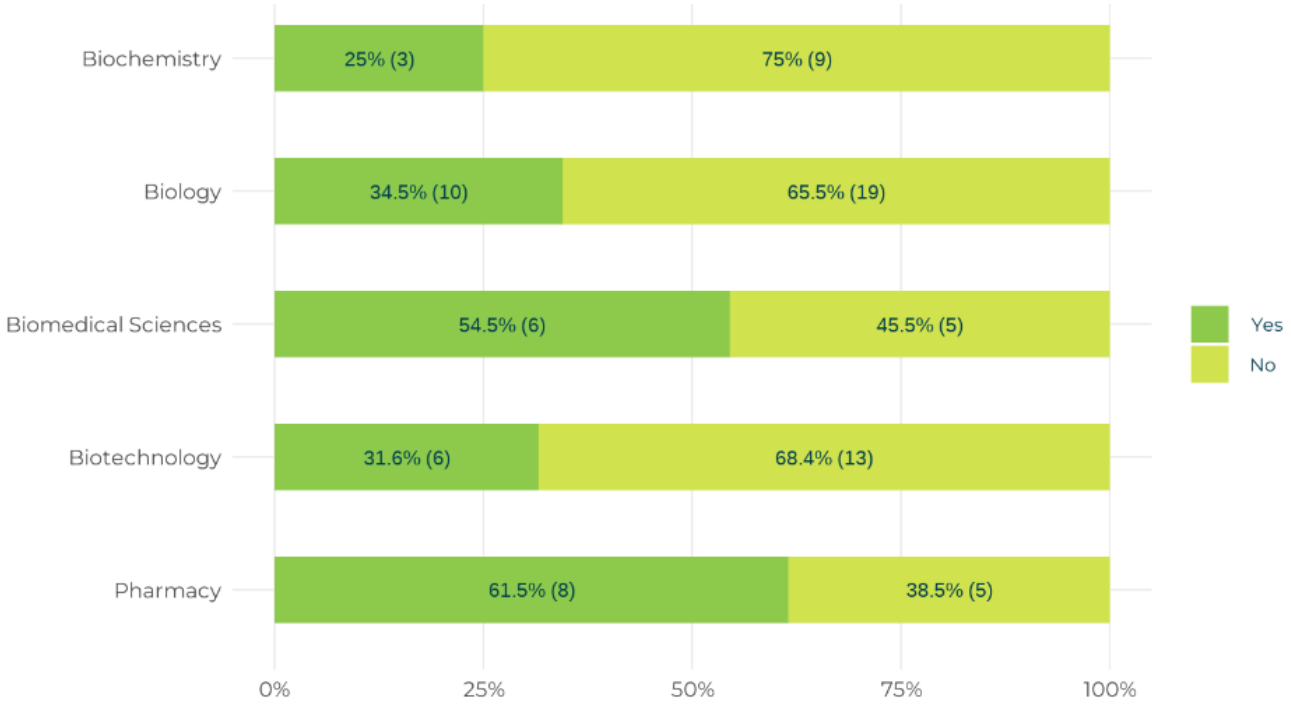


Figure 23. Percentage of employers who face difficulties when recruiting, by degree



Skills shortages among graduates (68%) make up the main difficulty when it comes to recruiting the right profiles

> Also noteworthy are the lack of graduates in the field (32%) and candidates being unwilling to accept the proposed salary (26%).

Figure 24. Difficulties in recruiting the right profiles from the field of Biosciences

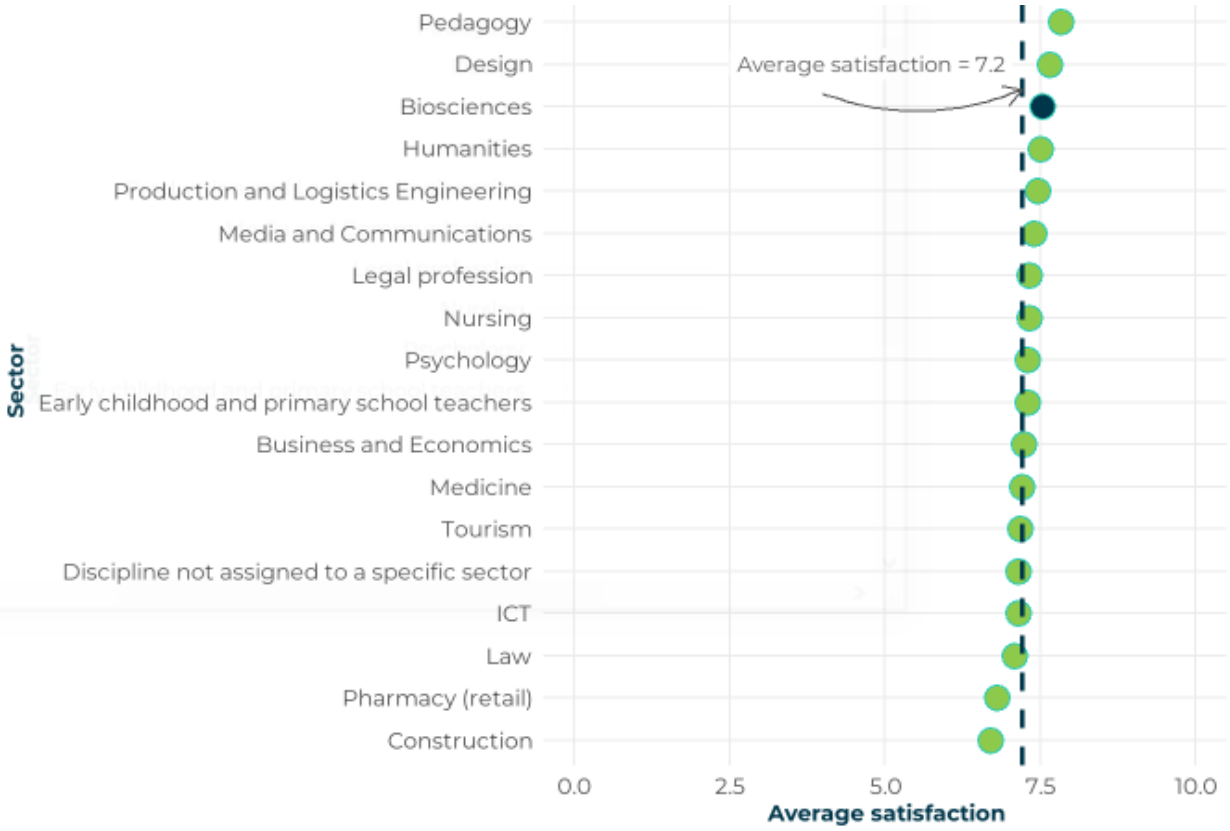
Main difficulties when recruiting graduates

Response	n	Percentage
Lack of qualified people with the necessary skills for the job	23	68
Lack of graduates in this field	11	32
They do not accept the salary	9	26
Limited resources prevent vacancies being properly advertised	5	15
They do not accept the type of contract	3	9
Other (specify)	3	9
Unwillingness to be geographically mobile	2	6
They do not accept the work schedule	1	3

Satisfaction with recent Biosciences graduates' skills, and skills they should improve[10]

Biosciences is the field of employment with the third most satisfied employers (7.6) in terms of graduates' skills

Figure 25. Comparison of the average satisfaction with the skills of recent graduates, by field included in the employer survey (from 0 to 10)



[10] In the employer survey questions on skills, employers are asked to choose between 1 and 5 skills that they think recent graduates should improve. Therefore, the percentages shown represent the percentage of employers that have selected a given skill.

Nearly 6 out of 10 employers (59.5%) believe that the ability to plan, draft, implement and/or coordinate research, development and innovation projects is the skill that graduates should improve the most

- With a similar proportion (52.4%), the ability to integrate knowledge in professional and research environments is the second skill requiring most improvement.
- The ability to organise, analyse and interpret experimental results statistically (36.9%) is the third skill that should be improved the most according to the surveyed employers.

Figure 26. Skills that recent Biosciences graduates should improve

(the skills selected by more than 30% of employers are highlighted in red)

Skill	n	Percentage
Ability to plan, draft, implement and/or coordinate research, development and innovation projects.	50	59.5
Integration of knowledge in a professional research environment.	44	52.4
Ability to organise, analyse and interpret experimental results from a statistical point of view.	31	36.9
Ability to apply a scientific approach to problem solving using the scientific method.	25	29.8
Use of statistical software to process complex data.	24	28.6
Knowledge of laboratory instrumentation, and safe application of experimental protocols and methodologies.	21	25.0
Use of different bioinformatics tools to extract information from databases in relation to biologically active molecules.	14	16.7
Application of professional values in the field of biosciences.	14	16.7
Ability to advise on issues related to the main areas of application and technologies in the field of biosciences.	13	15.5
Ability to apply knowledge of the fundamentals of biological sciences (energy and matter flows, regulation and/or association in biological systems) to the design of cell-based assays, to animal models, or to biotechnological processes.	5	6.0
Knowledge of current legislation on the ethical or sustainability implications of the design and use of genetically modified organisms and the use of animal models or other laboratory work.	5	6.0
Knowledge of the fundamentals of genetic engineering and application of the methodology used in the genetic modification of organisms for industrial use or biomedical research.	1	1.2

The need to improve graduates' ability to plan, draft, implement and/or coordinate research, development and innovation projects is particularly substantial in the case of Biomedical Sciences (81.8%), but not Pharmacy (30.8%)

- It is among Pharmacy graduates where most emphasis should be placed on improving the ability to integrate knowledge in professional and research environments (61.5%).
- The need to improve graduates' ability to organise, analyse and interpret experimental results statistically is particularly relevant in the case of Biotechnology (52.6%).

Figure 27. Skills that Biosciences graduates should improve, by degree

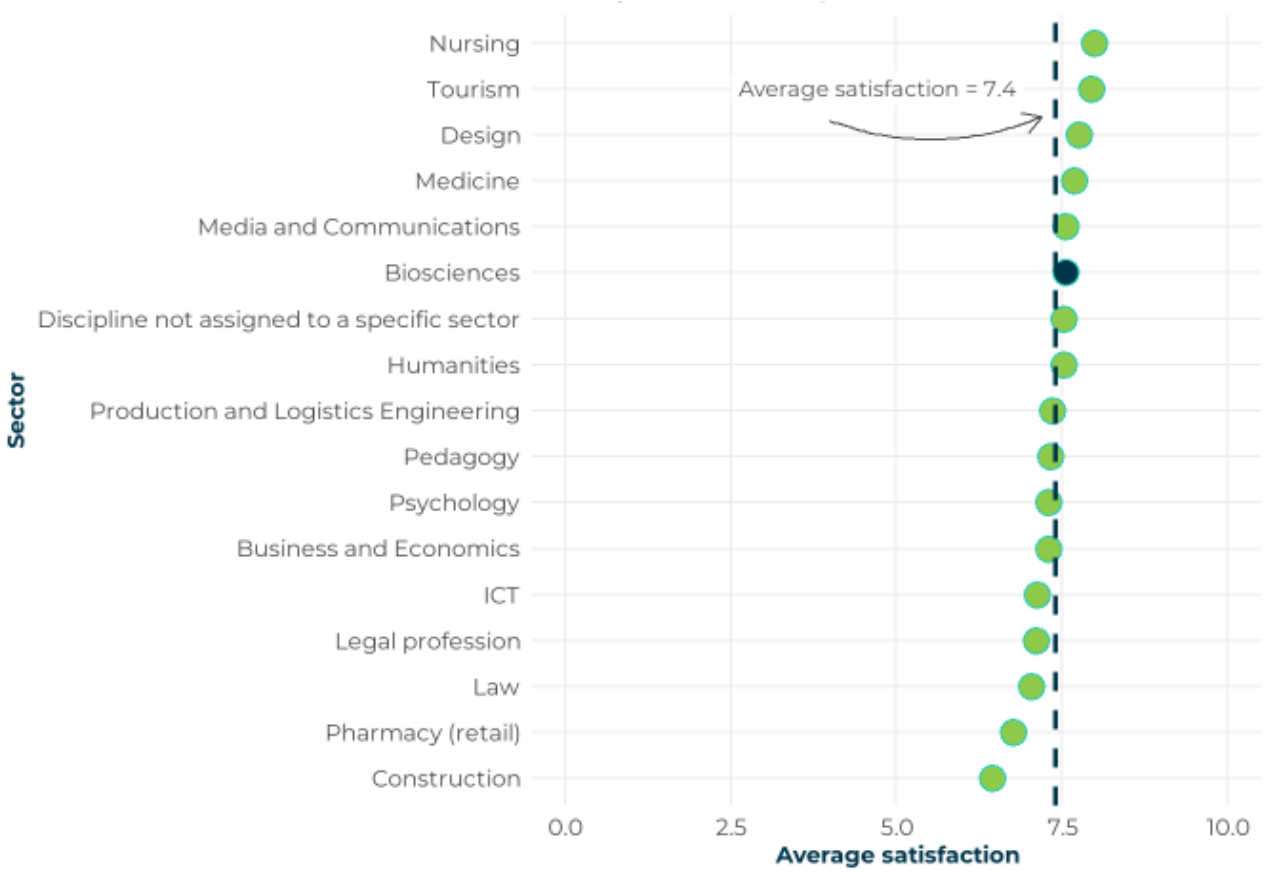
Skill	Biochemistry (%)	Biotechnology (%)	Pharmacy (%)	Biomedical Sciences (%)	Biology (%)
Ability to plan, draft, implement and/or coordinate research, development and innovation projects.	66.7	63.2	30.8	81.8	58.6
Integration of knowledge in a professional research environment.	58.3	36.8	61.5	54.5	55.2
Ability to organise, analyse and interpret experimental results from a statistical point of view.	25.0	52.6	23.1	27.3	41.4
Ability to apply a scientific approach to problem solving using the scientific method.	25.0	36.8	23.1	36.4	27.6
Use of statistical software to process complex data.	16.7	36.8	23.1	27.3	31.0
Knowledge of laboratory instrumentation, and safe application of experimental protocols and methodologies.	25.0	36.8	7.7	27.3	24.1
Use of different bioinformatics tools to extract information from databases in relation to biologically active molecules.	8.3	21.1	15.4	18.2	17.2

Application of professional values in the field of biosciences.	25.0	10.5	7.7	36.4	13.8
Ability to advise on issues related to the main areas of application and technologies in the field of biosciences.	16.7	10.5	0.0	18.2	24.1
Ability to apply knowledge of the fundamentals of biological sciences (energy and matter flows, regulation and/or association in biological systems) to the design of cell-based assays, to animal models, or to biotechnological processes.	0.0	15.8	7.7	0.0	3.4
Knowledge of current legislation on the ethical or sustainability implications of the design and use of genetically modified organisms and the use of animal models or other laboratory work.	8.3	0.0	0.0	18.2	6.9
Knowledge of the fundamentals of genetic engineering and application of the methodology used in the genetic modification of organisms for industrial use or biomedical research.	0.0	5.3	0.0	0.0	0.0

Employers' opinions on university work placement services and work placement students in the field of Biosciences

Employers in the field of Biosciences score university work placement services with a 7.6, making them the sixth most satisfied

Figure 28. Comparison of the average satisfaction with the work placement services of universities, by field included in the employer survey (from 0 to 10)



Average satisfaction with work placement services is particularly high for Pharmacy (8.6)

> Meanwhile, Biomedical Sciences (6.7) comes in below the average for the field (7.6) and for the Catalan Higher Education System as a whole (7.4).

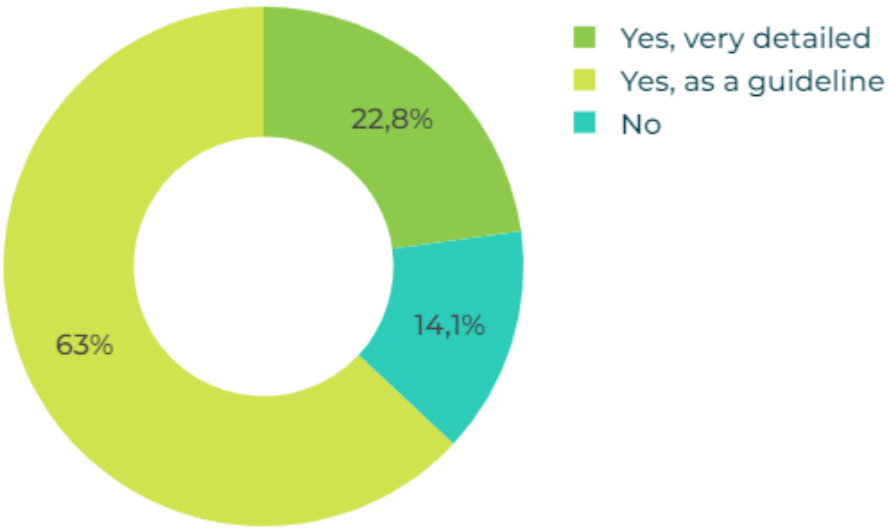
Table 8. Comparison of the average satisfaction with the work placement services of universities, by degree (from 0 to 10)

Degree	Average satisfaction
Biology	7.7
Biochemistry	7.8
Biotechnology	7.5
Biomedical Sciences	6.7
Pharmacy	8.6
Total Biosciences	**7.6**
Total SUC	**7.4**

Almost 9 out of 10 employers (85.8%) describe the training plan for work placement students as indicative or very detailed

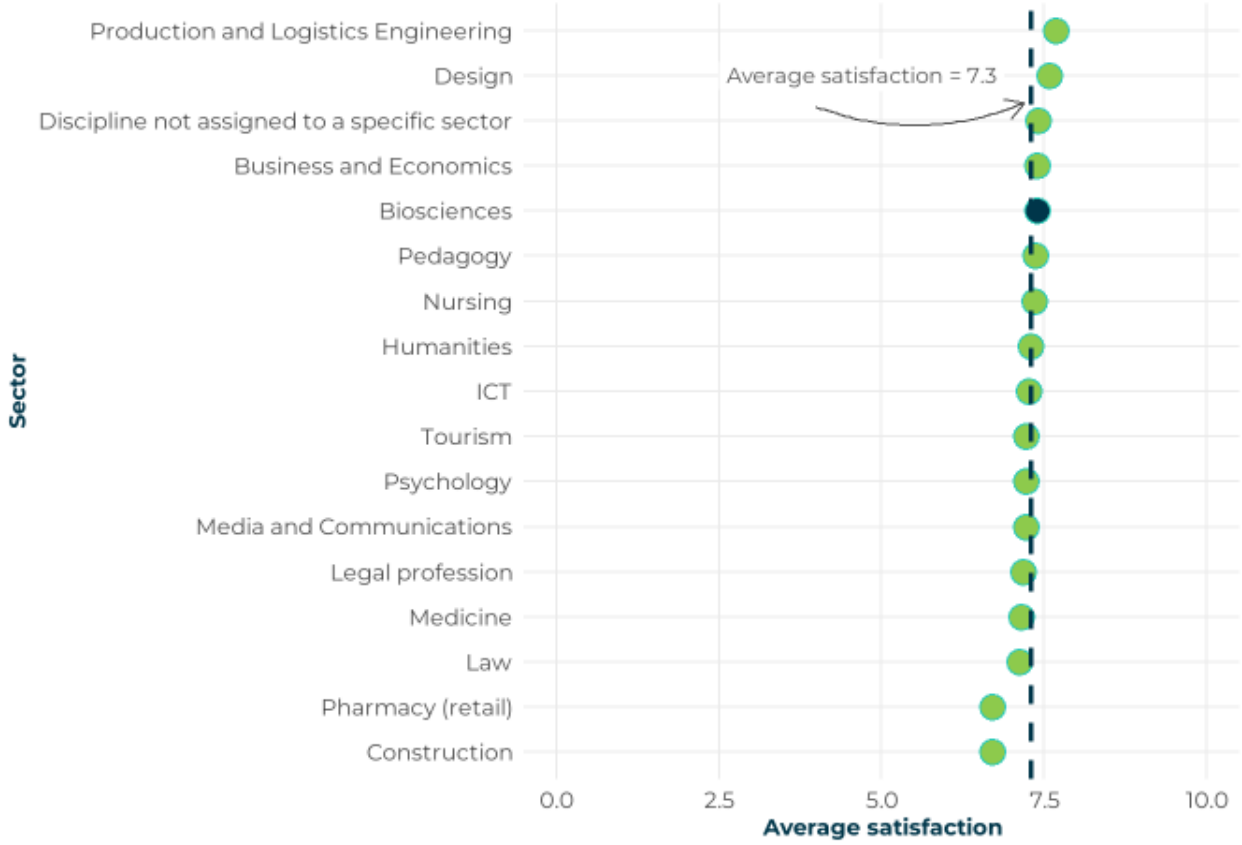
> However, the most frequent response is that the training plan is indicative (63% of cases).

Figure 29. Definition of the training plan of employers that have taken on work placement students from the field of Biosciences



Employers in the field of Biosciences are the fifth most satisfied (7.4) with the skills of work placement students, slightly above the overall Catalan Higher Education System average (7.3)

Figure 30. Comparison of the average satisfaction with the skills of work placement students, by field included in the employer survey (from 0 to 10)



Employers that take on work placement students from degrees in Biomedical Sciences are the most satisfied (7.7), while satisfaction among employers with Biotechnology students (7.2) is below the average for the field (7.4) and for the Catalan Higher Education System as a whole (7.3)

Table 9. Comparison of the average satisfaction with the skills of work placement students, by degree (from 0 to 10)

Degree	Average satisfaction
Biology	7.4
Biochemistry	7.3
Biotechnology	7.2
Biomedical Sciences	7.7
Pharmacy	7.6
Total Biosciences	**7.4**
Total SUC	**7.3**

Skills that have been worked on the most during the work placement period

Knowledge of laboratory instruments and the safe application of experimental protocols and methodologies is the skill that has been worked on the most during the work placement period in almost 2 out of 3 cases (60.6%)

> Also of note in this respect are the ability to integrate knowledge in professional and research environments (56.4%), the ability to apply a scientific approach to problem-solving (55.3%) and the ability to organise, analyse and interpret experimental results statistically (50.0%).

Figure 31. Skills in the field of Biosciences that have been worked on the most during the work placement period

(skills selected by more than 30% of the employers are highlighted in green)

Skill	n	Percentage
Knowledge of laboratory instrumentation, and safe application of experimental protocols and methodologies.	57	60.6
Integration of knowledge in a professional research environment.	53	56.4
Ability to apply a scientific approach to problem solving using the scientific method.	52	55.3
Ability to organise, analyse and interpret experimental results from a statistical point of view.	47	50.0
Ability to plan, draft, implement and/or coordinate research, development and innovation projects.	31	33.0
Application of professional values in the field of biosciences.	19	20.2
Use of statistical software to process complex data.	17	18.1
Ability to apply knowledge of the fundamentals of biological sciences (energy and matter flows, regulation and/or association in biological systems) to the design of cell-based assays, to animal models, or to biotechnological processes.	13	13.8
Ability to advise on issues related to the main areas of application and technologies in the field of biosciences.	11	11.7
Use of different bioinformatics tools to extract information from databases in relation to biologically active molecules.	8	8.5
Knowledge of the fundamentals of genetic engineering and application of the methodology used in the genetic modification of organisms for industrial use or biomedical research.	8	8.5
Knowledge of current legislation on the ethical or sustainability implications of the design and use of genetically modified organisms and the use of animal models or other laboratory work.	6	6.4
Others	4	4.3

There is a significant difference between the percentage of employers that selected the ability to manage projects as a skill that graduates should improve (59.5%, placing it first in this regard) and the percentage of students who worked on this skill during the work placement period (33%)

> Meanwhile, the skill worked on the most by work placement students (in 60.6% of the cases) ranks sixth among the skills that recruits should improve (25% of the cases): knowledge of laboratory instrumentation and the safe application of experimental protocols and methodologies.

Figure 32. Comparison between the percentage of employers that select a skill that graduates should improve and the skills they have worked on during the work placement period

(the skills are ranked from most to least selected)

Skill	Percentage (graduates)	Percentage (interns)	Ranking (graduates)	Ranking (interns)
Ability to plan, draft, implement and/or coordinate research, development and innovation projects.	59.5	33.0	1	5
Integration of knowledge in a professional research environment.	52.4	56.4	2	2
Ability to organise, analyse and interpret experimental results from a statistical point of view.	36.9	50.0	3	4
Ability to apply a scientific approach to problem solving using the scientific method.	29.8	55.3	4	3
Use of statistical software to process complex data.	28.6	18.1	5	7
Knowledge of laboratory instrumentation, and safe application of experimental protocols and methodologies.	25.0	60.6	6	1

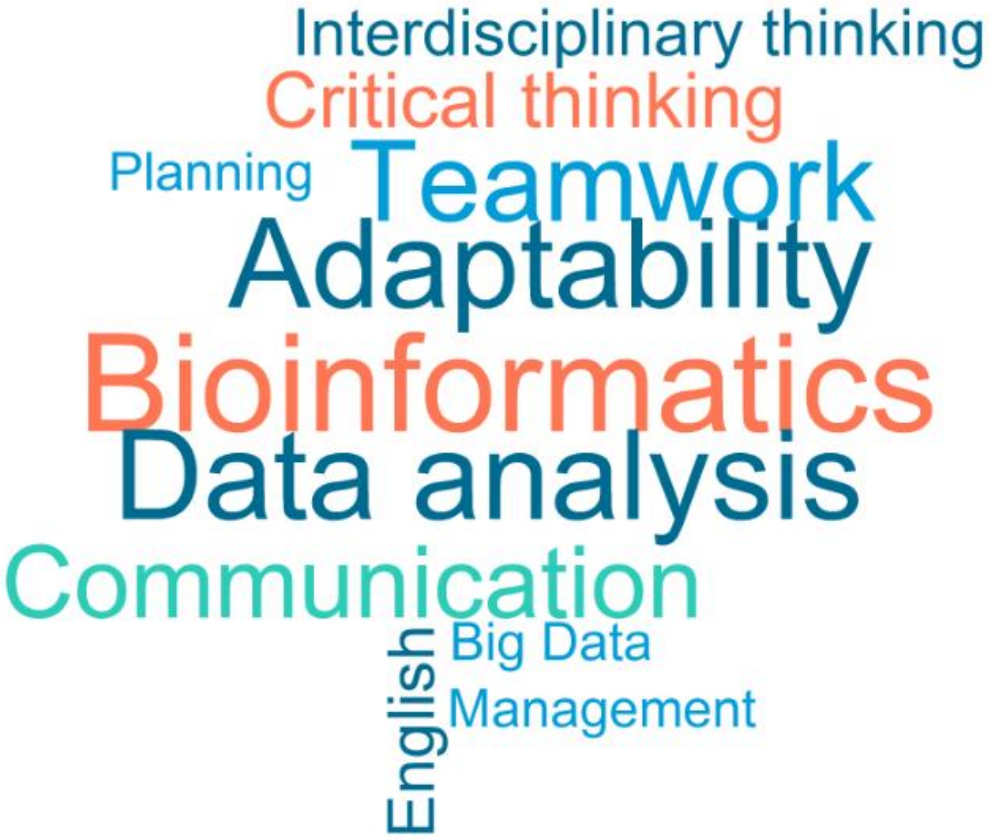
Use of different bioinformatics tools to extract information from databases in relation to biologically active molecules.	16.7	8.5	7	10
Application of professional values in the field of biosciences.	16.7	20.2	8	6
Ability to advise on issues related to the main areas of application and technologies in the field of biosciences.	15.5	11.7	9	9
Ability to apply knowledge of the fundamentals of biological sciences (energy and matter flows, regulation and/or association in biological systems) to the design of cell-based assays, to animal models, or to biotechnological processes.	6.0	13.8	10	8
Knowledge of current legislation on the ethical or sustainability implications of the design and use of genetically modified organisms and the use of animal models or other laboratory work.	6.0	6.4	11	12
Knowledge of the fundamentals of genetic engineering and application of the methodology used in the genetic modification of organisms for industrial use or biomedical research.	1.2	8.5	12	11

Outlook

Bioinformatics skills and data analysis are the technical skills that will become most important in the future according to employers

- Adaptability and communication stand out as cross-disciplinary skills, along with teamwork.
- Employers also emphasise having an interdisciplinary perspective, which includes technical and cross-disciplinary aspects.

Figure 33. Word cloud with the skills or knowledge that, according to employers, will become more important in the future



CONCLUSIONS

- Compared to the Catalan Higher Education System as a whole, recent graduates from the field of **Biosciences** are **more satisfied overall** with their respective degrees. Graduates are also highly satisfied with their **external work placements** and **final-year projects**, which is key given the importance of the skills worked on during these two training processes for students' **subsequent employability**.
- The quantity and quality of graduate **employment outcomes** in the field of **Biosciences** are similar, although slightly lower, than those of the Catalan Higher Education System as a whole. Indeed, 9 out of 10 graduates of the degrees included in this field were working three years after graduation, and of these, 7 out of 10 were performing degree-specific tasks and earning an average monthly salary of €2,068. However, there is **less contractual stability**, with a lower percentage of permanent contracts (44.4%) than in the Catalan Higher Education System as a whole (56.3%).
- **Employers** are **highly satisfied** with the skills of recent graduates: **Biosciences** is the third most outstanding field in this regard, of the eighteen fields compared during the fieldwork. Furthermore, although 4 out of 10 employers report difficulties when recruiting professionals (especially in **Biomedical Sciences** and **Pharmacy**), the field of **Biosciences** has the third fewest difficulties in this respect.
- **Biosciences** is also the field of employment with the highest demand for a **PhD as a job requirement**. Moreover, after specific fields such as Tourism and Humanities, employers in **Biosciences** rank third in terms of requiring a **high level of English proficiency** of new recruits, and fifth in reference to **other languages**. With regard to **language proficiency**, graduates report an **educational shortcoming** (difference between the education provided to work on a skill and the usefulness of that skill for work). Therefore, this is one of the skills that should most clearly be improved on these degree courses, as both employers and graduates agree on this point.
- The ability to plan, draft, implement and/or coordinate research, development and innovation projects is the main specific skill that employers say recent graduate recruits should improve. Again, this matches graduates' assessment of their degrees' educational shortcomings, as decision-making and leadership are the two skills (after language proficiency) that show the greatest difference between the education provided during the degree and the skills' usefulness in the workplace. However, employers rank this specific skill as the fifth most worked on by the work placement students they have taken on, which shows how difficult it can be to learn certain aspects of work responsibility in an educational context.
- Additionally, **graduates** report that their degrees provide an excess of education in **theoretical and practical knowledge** in relation to the usefulness of these skills for work. In this regard, **employers** also point to the **ability to integrate knowledge in**

professional and research environments as the second specific competence that most needs to be improved (especially in **Pharmacy**). In other words, the excess of theoretical and practical education felt by graduates is something that should be better adapted to the skills requirements of the world of work.

- Finally, regarding the skills that will be necessary in the field of **Biosciences** in the future, **employers** believe that skills related to **bioinformatics** and **data analysis** will become most important, as will **adaptability** and **communication** as cross-disciplinary skills.

Throughout this report, differences have been observed among the **degrees that make up the field of Biosciences**, both in graduate satisfaction and in the quantity and quality of employment outcomes. In this respect, and by way of summary:

- **Biology** graduates display the highest levels of satisfaction with most aspects relating to their degree, which could be explained by the high proportion of people who decide to pursue this degree out of personal interest. With respect to employment outcomes, this group has the lowest percentage of graduates who were working three years after graduation and, among those who were working, the lowest proportion of graduates carrying out degree-specific tasks. Similarly, income and job stability are lower among Biology graduates than among their peers from the other degrees in the field. It should also be taken into account that Biology has the highest number of places available and that, although a high percentage of students choose the degree out of personal interest, another high proportion do so because of the cut-off mark.
- **Biotechnology** graduates also display high levels of satisfaction; in fact, this is the only degree in the field of Biosciences that statistically exceeds overall satisfaction with respect to **improving professional skills**. Compared to the other degrees in the field, a high proportion of students choose a Biotechnology degree because of the good career prospects. However, the employment outcomes and working conditions are similar to those of the other graduates.
- **Applications** for admission to **Biomedical Sciences** degrees at public universities far exceed the places available (by 227.4%). Graduates' overall satisfaction with their degree is close to the average, but their satisfaction with the **external work placements** and **final-year projects** is the highest in the field. It is also the degree with the highest proportion of people who choose it out of **personal interest**. With regard to employment outcomes in the field of Biosciences, Biomedical Sciences has the second highest percentage of graduates who perform **degree-specific functions** at work, although they suffer the **lowest contractual stability**. These graduates also report the most prominent educational shortcoming with respect to the usefulness of **English**, **decision-making** and **leadership** in the workplace.
- **Biochemistry** has the smallest absolute number of places available for students wishing to pursue the degree. These graduates are the least satisfied in the field with respect to how well the degree improves their professional skills, but are highly satisfied with the **external work placements**. Additionally, these graduates display the second highest employment rate.

- **Pharmacy** has the greatest proportion of graduates who say they chose the degree because of its **career prospects**, compared to the field of Biosciences and the Catalan Higher Education System as a whole. In this regard, it is worth noting that many of these individuals will find employment in **pharmacies**, making it a degree with a clearly differentiated profile. Pharmacy graduates are the **most satisfied overall** and the ones who would **most take their degree again**, although their satisfaction with the improvement of **communication skills** and **personal skills** is much lower than in the rest of the field. The same is true for the **external work placements** and **final-year projects**, likely because of this differentiated professional profile. This degree also has the highest **employment rate** and percentage of graduates performing **degree-specific tasks**. Furthermore, both the **gross monthly salary** and **contractual stability** are also higher than those of other graduates in the field, and it is the only degree in Biosciences that exceeds the general average of the working conditions expressed in the OQI.

DATA SHEET

Employer survey

Technical information of the 3rd edition of the employer survey (2021-2022)

Population	Organisations that have hired in the last three years recent graduates from universities located in Catalonia
Sampling frame	Companies, organisations and institutions that have signed a work placement agreement and/or are listed in Catalan universities' job banks.
Survey type	Online. Software used SurveyMonkey
Average time taken	6' 45"

Summary of the responses to the 3rd edition of the employer survey (2021-2022)

Sampling frame (all sectors)	29,865
Population of employers in the field of Biosciences	Unknown
Responses (all sectors)	2,423
Response rate (all sectors)	8.11%
Response from employers in the field of Biosciences	90

RELATED DEGREE PROGRAMMES

Bachelor's degrees offered in the 2021/2022 academic year

	UB	UAB	UdG	URV	UdL	UPC	UPF	URL	UIC	UVic-UCC
Biology										
Biology	√	√	√							√
Environmental Biology		√								
Biochemistry										
Biochemistry	√	√								
Biochemistry and Molecular Biology				√						
Biotechnology										
Biotechnology	√	√	√	√	√			√		√
Bioengineering									√	
Biomedical Engineering	√		√	√		√	√			
Biological Systems Engineering						√				
Biomedical Sciences										
Biomedical Sciences	√	√			√				√	
Human Biology							√			
Pharmacy										
Pharmacy	√							√		

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