

# Searching Research Excellence

An in-depth bibliometric analysis of the  
international research output of the  
University of Granada

**BIBLIOMETRIC REPORT**  
Report Code: 1013-05  
May 2014



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Universidad  
de Granada

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international research contribution of the  
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Vice-Rector's Office of Research Policy  
Bibliometric Unit

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# PREFACE

It is well known that no one should consider research evaluation as the result of isolated achievements, but as the constant analysis of the processes of an institution, offering evolving portraits of its performance. Following this line of thought, the University of Granada developed a bibliometric unit within the Vice-Rector of Research Policy intending to meet information needs focused on facilitating decision-making. In the last few years many reports and analyses have been conducted all of which are available in the website of the bibliometric unit.

The authors of this report are convinced on the benefits of research evaluation as a tool for diagnosis and for increasing the visibility of research in the UGR. It also responds to promoting research through the most prestigious communication channels, and it allows the reader to learn on the impact of the research produced by the academic community. Finally, this report allows to monitor and inform on the activity of the university in the eyes of society.

Despite the detailed information provided on the sources and methodologies employed, we must warn that there are no shortcuts here. We must never consider manipulating the indicators or selecting specific sources in order to fulfill our goals. Excellence in science is relatively easy to identify when using certain channels. In this report we have tried to identify it and describe it accurately, trying to avoid possible misinterpretations.

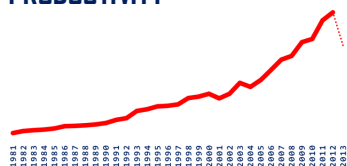
# EXECUTIVE SUMMARY

## GENERAL OVERVIEW OF THE UNIVERSITY OF GRANADA

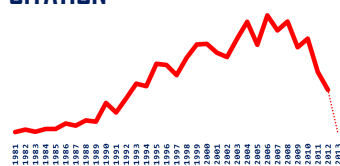
The University of Granada shows an increasing productivity trend where the highest relative increase is found between 1992 and 1993 with a 3.66% of increase. Although with sporadic decreases in 2000s, the research output of the University of Granada does not seem to have found its peak as it currently surpasses the 2000 papers per year and seems to continue growing. As it would be expected, the picture is radically different when observing the raw number of citations received by year. Here there is no stable pattern. There is a perceived increase of the citation impact since the beginning of the 1990s but then diminishes in the mid 2000s.

However, when focusing on normalized impact metrics which compare the raw number of citations received with citation differences between fields, as well as those which take into account journal-based bibliometric indicators, a more accurate pattern of the scientific impact of the University of Granada emerges. Here we find a constant and moderate increase of the scientific impact of the output of the University of Granada which has accelerated its pace since 2010, showing a promising start of an increasing trend. Regarding the disciplinary profile of the University of Granada. There seems to be an increase on the interdisciplinary nature of the research output. This is clearly shown by the disciplinary metrics displayed which display complementary patterns.

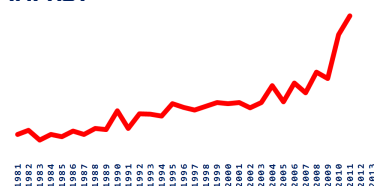
### PRODUCTIVITY



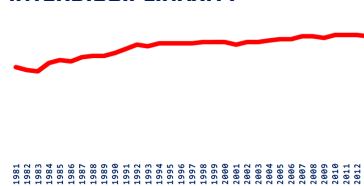
### CITATION



### IMPACT



### INTERDISCIPLINARITY



## HUMANITIES AND SOCIAL SCIENCES

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**Historical 1981-2013:** Historically, the most productive subject category of the University of Granada in the area of Humanities & Social Sciences is *Information Science & Library Science* followed by *Education & Educational Research* and *Language & Linguistics*. Regarding the scientific impact of research in the Humanities & Social Sciences, the fields with more raw citations are *Information Science & Library Science*, *Management* and *Psychology, Social*. But those with a higher impact when using normalized indicators are *Business, Management* and *Religion*.

**Actual 2009-2013:** When focusing on the last five years, the most productive subject categories are *Education & Educational Research* followed by *Information Science & Library Science* and *Linguistics*. *Information Science & Library Science* is once again the category which has received the highest number of citations, with *Psychology, Social* and *Management* in second and third place. Finally, we must emphasize the fields of *Transportation*, *Information Science & Library Science* and *Business* as the categories with a highest scientific impact when considering normalized indicators.

## ENGINEERING & TECHNOLOGY

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**Historical 1981-2013:** In the area of Engineering & Technology, the subject categories of *Computer Science*, *Artificial Intelligence*, *Engineering, Electrical & Electronic*, and *Computer Science, Theory & Methods* are the three most productive categories. The first one is also the most cited in raw numbers and the third one in relative terms. The second and third most cited categories are *Materials Science, Multidisciplinary* and *Engineering, Electrical & Electronic* respectively. The first two categories with a highest normalized impact are *Automation & Control Systems*, and *Computer Science, Cybernetics*.

**Actual 2009-2013:** The trend in the last five years is similar regarding the production of subject categories, remaining the same ones as the top 3 most productive categories. Regarding the scientific impact of the categories, *Computer Science, Artificial Intelligence* is the most cited category in raw numbers and the second one in relative terms. *Engineering, Electrical & Electronic*, and *Materials Science, Multidisciplinary* are the second and third most cited categories respectively. On its behalf, *Computer Science, Information Systems* is the category with a highest normalized scientific impact.

## EXACT & NATURAL SCIENCES

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**Historical 1981-2013:** *Mathematics, Biodiversity Conservation* and *Mathematics, Applied* are the three most productive subject categories in the area of Exact & Natural Sciences since 1980. Regarding the scientific impact of subject categories in this area, *Physics, Particles & Fields*, *Physics, Multidisciplinary*, and *Statistics & Probability* are the categories with a highest relative impact, while

*Biodiversity Conservation*, *Physics, Particles & Fields*, and *Physics, Multidisciplinary* are the ones with the highest raw number of citations.

**Actual 2009-2013:** In the last five years, the picture has changed significantly. *Mathematics, Applied, Mathematics*, and *Physics, Particles & Fields* are now the most productive categories. As for their scientific impact, *Physics, Particles & Fields*, and *Physics, Multidisciplinary* are both, the most cited in raw and relative terms.

## LIFE & HEALTH SCIENCES

**Historical 1981-2013:** In the area of Life & Health Sciences the most productive and most cited subject categories in the 1980-2013 time period are *Biochemistry & Molecular Biology*, *Neurosciences*, and *Pharmacology & Pharmacy*. The categories which have had a highest scientific impact in relative terms are *Public, Environmental & Occupational Health*, *Dentistry, Oral Surgery & Medicine*, and *Nutrition & Dietetics* respectively.

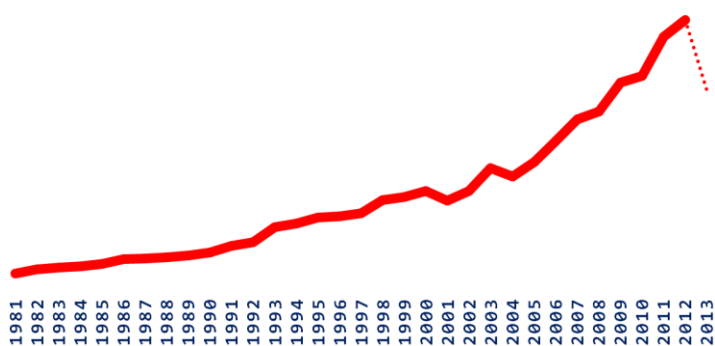
**Actual 2009-2013:** In the period 2009-2013 the categories of *Nutrition & Dietetics*, *Biochemistry & Molecular Biology* and *Neurosciences* have positioned themselves as the most productive and most cited subject categories. However, those with a highest scientific impact in relative terms are *Public, Environmental & Occupational Health*, *Sport Sciences*, and *Endocrinology & Metabolism* respectively.

# GENERAL RESULTS



**PRODUCTION**

Evolution of the number of Web of Science Documents

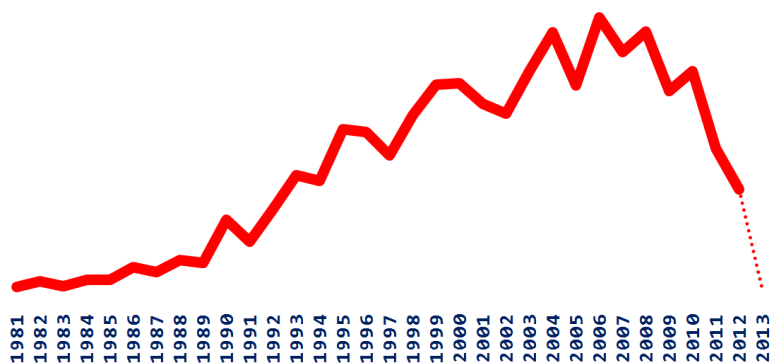


Year	Web of Science Documents	Year	Web of Science Documents
□ 1981	118	□ 1998	821 ↑
□ 1982	157 ↑	□ 1999	847 ↑
□ 1983	178 ↑	□ 2000	906 ↑
□ 1984	189 ↑	□ 2001	812 ↓
□ 1985	208 ↑	□ 2002	905 ↑
□ 1986	259 ↑	□ 2003	1120 ↑
□ 1987	260 ↑	□ 2004	1044 ↓
□ 1988	273 ↑	□ 2005	1182 ↑
□ 1989	293 ↑	□ 2006	1383 ↑
□ 1990	317 ↑	□ 2007	1584 ↑
□ 1991	385 ↑	□ 2008	1664 ↑
□ 1992	415 ↑	□ 2009	1936 ↑
□ 1993	563 ↑	□ 2010	1999 ↑
□ 1994	597 ↑	□ 2011	2372 ↑
□ 1995	654 ↑	□ 2012	2531 ↑
□ 1996	665 ↑	□ 2013	1863 ↑
□ 1997	694 ↑	<b>TOTAL →</b>	<b>29194</b>



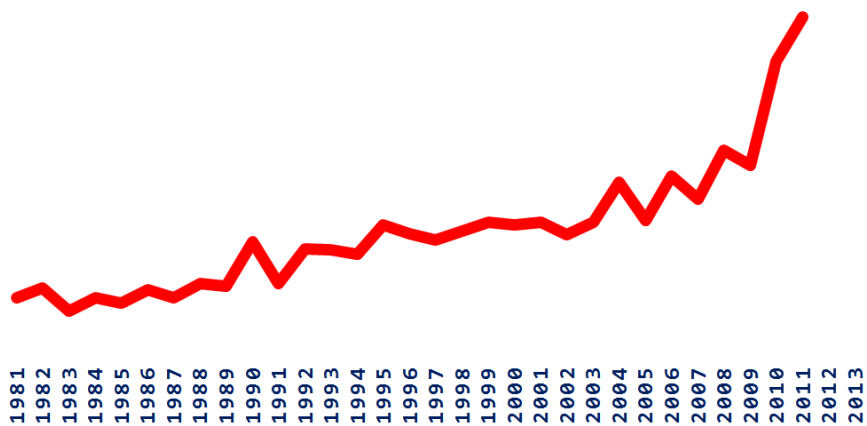
## IMPACT AND CITATION METRICS

Total citations received each year



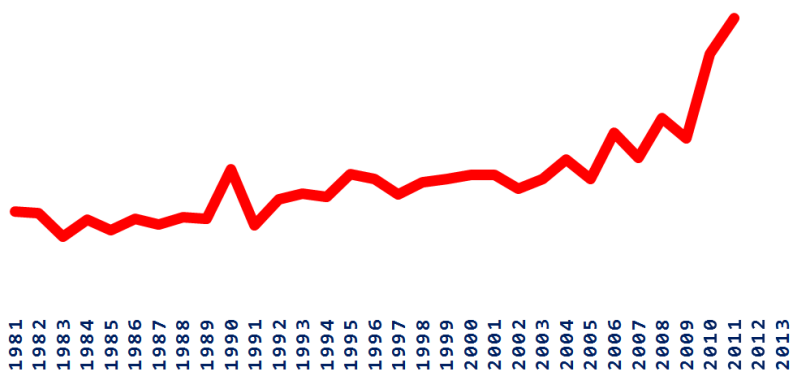
Year	Times Cited	Year	Times Cited
□ 1981	954	□ 1998	13800
□ 1982	1366	□ 1999	16058
□ 1983	995	□ 2000	16186
□ 1984	1469	□ 2001	14618
□ 1985	1431	□ 2002	13920
□ 1986	2400	□ 2003	17065
□ 1987	2065	□ 2004	19974
□ 1988	2944	□ 2005	16039
□ 1989	2744	□ 2006	21115
□ 1990	5941	□ 2007	18532
□ 1991	4297	□ 2008	20063
□ 1992	6776	□ 2009	15607
□ 1993	9267	□ 2010	17078
□ 1994	8882	□ 2011	11322
□ 1995	12729	□ 2012	8231
□ 1996	12515	□ 2013	706
□ 1997	10787	<b>TOTAL →</b>	<b>327876</b>

Category Actual/Expected Citations



Year	Category Actual/Expected Citations	Year	Category Actual/Expected Citations
□ 1981	<b>0.44</b> ↓	□ 1998	<b>0.97</b> ↓
□ 1982	<b>0.52</b> ↓	□ 1999	<b>1.04</b> ↑
□ 1983	<b>0.33</b> ↓	□ 2000	<b>1.02</b> ↑
□ 1984	<b>0.44</b> ↓	□ 2001	<b>1.04</b> ↑
□ 1985	<b>0.40</b> ↓	□ 2002	<b>0.94</b> ↓
□ 1986	<b>0.50</b> ↓	□ 2003	<b>1.04</b> ↑
□ 1987	<b>0.44</b> ↓	□ 2004	<b>1.36</b> ↑
□ 1988	<b>0.55</b> ↓	□ 2005	<b>1.06</b> ↑
□ 1989	<b>0.53</b> ↓	□ 2006	<b>1.41</b> ↑
□ 1990	<b>0.89</b> ↓	□ 2007	<b>1.23</b> ↑
□ 1991	<b>0.55</b> ↓	□ 2008	<b>1.62</b> ↑
□ 1992	<b>0.83</b> ↓	□ 2009	<b>1.50</b> ↑
□ 1993	<b>0.82</b> ↓	□ 2010	<b>2.33</b> ↑
□ 1994	<b>0.79</b> ↓	□ 2011	<b>2.68</b> ↑
□ 1995	<b>1.02</b> ↑	□ 2012	<b>8.23</b> ↑
□ 1996	<b>0.95</b> ↓	□ 2013	----
□ 1997	<b>0.90</b> ↓	<b>TOTAL</b> →	<b>1.14</b>

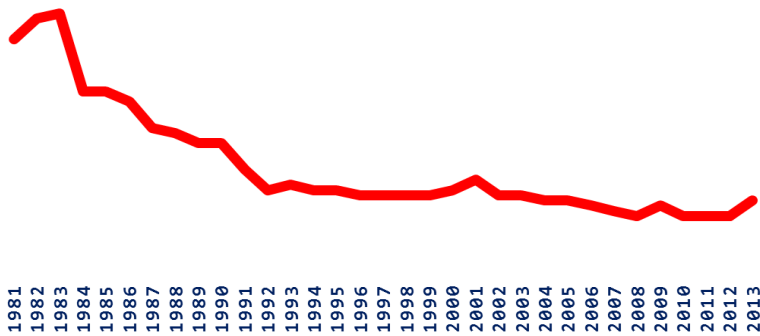
## Journal Actual/Expected Citations



Year	Journal Actual/ Expected Citations	Year	Journal Actual/ Expected Citations
□ 1981	<b>0.82 ↓</b>	□ 1998	<b>1.08 ↑</b>
□ 1982	<b>0.81 ↓</b>	□ 1999	<b>1.11 ↑</b>
□ 1983	<b>0.60 ↓</b>	□ 2000	<b>1.14 ↑</b>
□ 1984	<b>0.75 ↓</b>	□ 2001	<b>1.14 ↑</b>
□ 1985	<b>0.66 ↓</b>	□ 2002	<b>1.02 ↑</b>
□ 1986	<b>0.76 ↓</b>	□ 2003	<b>1.11 ↑</b>
□ 1987	<b>0.71 ↓</b>	□ 2004	<b>1.28 ↑</b>
□ 1988	<b>0.77 ↓</b>	□ 2005	<b>1.11 ↑</b>
□ 1989	<b>0.76 ↓</b>	□ 2006	<b>1.51 ↑</b>
□ 1990	<b>1.19 ↑</b>	□ 2007	<b>1.29 ↑</b>
□ 1991	<b>0.70 ↓</b>	□ 2008	<b>1.64 ↑</b>
□ 1992	<b>0.93 ↓</b>	□ 2009	<b>1.46 ↑</b>
□ 1993	<b>0.98 ↓</b>	□ 2010	<b>2.20 ↑</b>
□ 1994	<b>0.95 ↓</b>	□ 2011	<b>2.51 ↑</b>
□ 1995	<b>1.15 ↑</b>	□ 2012	<b>6.03 ↑</b>
□ 1996	<b>1.11 ↑</b>	□ 2013	---
□ 1997	<b>0.97 ↓</b>	<b>TOTAL →</b>	<b>1.28</b>

## DISCIPLINARY METRICS

Disciplinary indexd each yearch



Year	Times Cited	Year	Times Cited
□ 1981	0.045	□ 1998	0.015
□ 1982	0.049	□ 1999	0.015
□ 1983	0.050	□ 2000	0.016
□ 1984	0.035	□ 2001	0.018
□ 1985	0.035	□ 2002	0.015
□ 1986	0.033	□ 2003	0.015
□ 1987	0.028	□ 2004	0.014
□ 1988	0.027	□ 2005	0.014
□ 1989	0.025	□ 2006	0.013
□ 1990	0.025	□ 2007	0.012
□ 1991	0.020	□ 2008	0.011
□ 1992	0.016	□ 2009	0.013
□ 1993	0.017	□ 2010	0.011
□ 1994	0.016	□ 2011	0.011
□ 1995	0.016	□ 2012	0.011
□ 1996	0.015	□ 2013	0.014
□ 1997	0.015	<b>TOTAL →</b>	<b>0.012</b>

## Interdisciplinarity index



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Year	Journal Actual/ Expected Citations	Year	Journal Actual/ Expected Citations
□ 1981	<b>0.65</b>	□ 1998	<b>0.83</b>
□ 1982	<b>0.63</b>	□ 1999	<b>0.83</b>
□ 1983	<b>0.62</b>	□ 2000	<b>0.83</b>
□ 1984	<b>0.68</b>	□ 2001	<b>0.81</b>
□ 1985	<b>0.7</b>	□ 2002	<b>0.83</b>
□ 1986	<b>0.69</b>	□ 2003	<b>0.83</b>
□ 1987	<b>0.72</b>	□ 2004	<b>0.84</b>
□ 1988	<b>0.73</b>	□ 2005	<b>0.85</b>
□ 1989	<b>0.73</b>	□ 2006	<b>0.85</b>
□ 1990	<b>0.75</b>	□ 2007	<b>0.87</b>
□ 1991	<b>0.78</b>	□ 2008	<b>0.87</b>
□ 1992	<b>0.81</b>	□ 2009	<b>0.86</b>
□ 1993	<b>0.8</b>	□ 2010	<b>0.88</b>
□ 1994	<b>0.82</b>	□ 2011	<b>0.88</b>
□ 1995	<b>0.82</b>	□ 2012	<b>0.88</b>
□ 1996	<b>0.82</b>	□ 2013	<b>0.87</b>
□ 1997	<b>0.82</b>	<b>TOTAL →</b>	<b>0,88</b>

## COMPLETE METRICS

	Productivity		Impact		Disciplinary		Collaboration				
	Web of Science Documents	Times Cited	Category Actual/Expected Citations	Journal Actual/Expected Citations	Disciplinary index	Inter-disciplinary index	Unique Authors	Average Authors per Document	Unique Institutions	Average Institutions per Document	Average Countries/Territories per Document
□ 1981	118	954	0.44	0.82	0.045	0.65	255	3.29	18	1.19	1.04
□ 1982	157	1,366	0.52	0.81	0.049	0.63	326	3.37	24	1.22	1.04
□ 1983	178	995	0.33	0.60	0.050	0.62	332	3.19	24	1.22	1.02
□ 1984	189	1,469	0.44	0.75	0.035	0.68	365	3.40	42	1.31	1.08
□ 1985	208	1,431	0.40	0.66	0.035	0.7	405	3.44	48	1.37	1.09
□ 1986	259	2,4	0.50	0.76	0.033	0.69	479	3.34	47	1.32	1.08
□ 1987	260	2,065	0.44	0.71	0.028	0.72	552	3.40	60	1.38	1.11
□ 1988	273	2,944	0.55	0.77	0.027	0.73	618	3.52	55	1.24	1.06
□ 1989	293	2,744	0.53	0.76	0.025	0.73	633	3.53	59	1.35	1.11
□ 1990	317	5,941	0.89	1.19	0.025	0.75	753	3.81	92	1.40	1.17
□ 1991	385	4,297	0.55	0.70	0.020	0.78	828	3.72	121	1.46	1.20
□ 1992	415	6,776	0.83	0.93	0.016	0.81	1,241	4.25	214	1.76	1.29
□ 1993	563	9,267	0.82	0.98	0.017	0.8	1,211	3.69	147	1.49	1.22
□ 1994	597	8,882	0.79	0.95	0.016	0.82	1,284	3.79	183	1.52	1.24
□ 1995	654	12,729	1.02	1.15	0.016	0.82	1,685	4.17	280	1.75	1.29
□ 1996	665	12,515	0.95	1.11	0.015	0.82	1,836	4.29	322	1.77	1.29
□ 1997	694	10,787	0.90	0.97	0.015	0.82	1,619	3.79	235	1.65	1.24
□ 1998	821	13,8	0.97	1.08	0.015	0.83	1,808	3.86	290	1.75	1.32
□ 1999	847	16,058	1.04	1.11	0.015	0.83	1,886	3.87	355	1.86	1.36
□ 2000	906	16,186	1.02	1.14	0.016	0.83	2,045	3.84	391	1.85	1.38
□ 2001	812	14,618	1.04	1.14	0.018	0.81	2,035	4.04	428	2.00	1.41
□ 2002	905	13,92	0.94	1.02	0.015	0.83	2,124	4.07	425	1.95	1.40
□ 2003	1120	17,065	1.04	1.11	0.015	0.83	2,893	4.44	603	2.15	1.48
□ 2004	1044	19,974	1.36	1.28	0.014	0.84	3,245	5.16	660	2.26	1.5
□ 2005	1182	16,039	1.06	1.11	0.014	0.85	3,087	4.36	617	2.13	1.45
□ 2006	1383	21,115	1.41	1.51	0.013	0.85	4,013	4.87	814	2.26	1.46
□ 2007	1584	18,532	1.23	1.29	0.012	0.87	4,671	4.85	934	2.26	1.52
□ 2008	1664	20,063	1.62	1.64	0.011	0.87	5,302	5.82	1,158	2.59	1.59
□ 2009	1936	15,607	1.50	1.46	0.013	0.86	5,628	5.47	1,133	2.41	1.54
□ 2010	1999	17,078	2.33	2.20	0.011	0.88	10,668	22.65	1,532	4.00	1.88
□ 2011	2372	11,322	2.68	2.51	0.011	0.88	12,114	68.69	1,909	8.00	2.64
□ 2012	2531	8,231	7.87	6.03	0.011	0.88	13,683	140.05	2,051	13.46	3.51
□ 2013	---	---	---	---	0.014	0.87	13,661	90.17	2,459	10.16	2.99
→TOTAL	29194	327876	1,14	1,28	0.012	0,88	43,065	29.82	7,547	4.29	1.84

□ Average Countries/Territories per □ Document

1,23

1,33

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