QS Subject 2022

The QS Subject analyzes participating institutions in 51 areas of knowledge, divided into five broad areas: arts and humanities, life and clinical sciences, natural sciences, engineering and technology, and applied social and social sciences.

The performance of state universities in São Paulo in the 2021 edition of the QS Subject was analyzed in a [report that can be consulted](#) on the Metricas project website. This analysis will examine the areas of knowledge in which universities have improved their positioning and in which this positioning was lower than that observed in 2022. Finally, the indicators that were decisive in these changes will be analyzed.

Methodology

The QS Subject ranking examines four indicators with variable weighting: a) the result of a survey on academic reputation; b) the result of a survey on the institution's reputation with employers; c) the number of citations per article (citation rate); and d) a variant of the Hirsch index that considers a period of five years. This indicator aims to measure highly cited productivity as h articles with h citations. This methodology gives greater weight to highly productive research groups, a dimension that is not adequately represented when using only the average citation rate.

Recommendations for course coordinators who want to improve their position in this ranking

- The areas of knowledge that improved their position did it through enhancing their **academic reputation** scores – this is best done by considering the following aspects in departmental planning:
    o Postgraduate mobility – sending your postgraduates abroad and receiving significant numbers of postgraduates promotes the institution's research culture.
    o Undergraduate mobility programs to both send and receive students.
    o Production of online teaching resources (in Portuguese and English), including but not limited to short courses, specialisation courses, micro-credentials, online seminars and webinars.
    o Hosting of academic events, online and presential, such as international conferences, summer schools, São Paulo Advanced Study Schools supported by FAPESP.
    o Tracking graduates who remain in academia, encouraging ongoing engagement with the department.

- The scores for **employer reputation** fell in almost all areas of knowledge this year. In order to strengthen our bonds with society, departmental leaders could consider the following types of action:
  o Incorporating diverse stakeholders in planning, research, teaching and evaluation exercises. This includes business leaders, alumni, civil society and other relevant stakeholders.
  o Fostering greater integration of students during their study – encouraging a sense of institutional identity that lasts a lifetime. More details will follow in subsequent technical notes.
  o Tracking graduates into the workplace, engaging with them in surveys and feedback, as well as offering them advantages for their status as alumni of the department.
  o Build more integrated teaching opportunities at undergraduate level with relevant employers – whether with cultural institutions, theatres, galleries and museums for arts and humanities subjects, or engineering and technology firms for engineering subjects. Effective communication and integration will help to raise awareness of the university and build graduate employment skills.

- **Citations and H-Index** have less of an influence on this ranking, in general, but some areas of knowledge at some institutions can benefit from concentrating on this. Typically, if the area of knowledge is outside the top 300 of the ranking, then gains in position can be made easily. If this is part of the strategy, the following should be considered:

  o For **citations**, prioritising quality and rigor of research instead of volume of research in evaluations should be a priority. Avoid setting targets in terms of numbers of articles.
  o Increasing the availability of research leads to increasing the citation rate – encourage researchers to public in open access journals and encourage them to use social media to promote it as part of a publication strategy. This strategy might also include lay summaries, and video abstracts.
  o **H Index** measures the presence of large numbers of highly cited articles. This is best achieved by encouraging the formation of high impact research groups and centres.

USP

USP's performance this year was mixed – there were 6 areas that rose by more than 10 positions, while there were also 7 that fell by more than 10 positions.

Areas that improved their position

Subject	2022	2021	Change	Academic	Employer	Citations	H	International	Score
Accounting and finance	92=	101-150	33	71.6	76.9	59.8	59.5		70.8
Sports related subjects	49=	51-100	26	69.1	69.8	87.4	86.1		74.5
Chemistry	92=	108	16	72.5	80.5	73.8	67.1		73.3
Sociology	49=	63=	14	79.6	74.7	64.3	61.6		75.6
Life and medical sciences	61	74=	13	82.1	75.6	74.4	70.6	85.1	77.9
Biological sciences	93=	106=	13	73.5	77.6	76.0	75.2		75.0
Medicine	77	85=	8	70.3	75.4	83.9	77.2		75.9
Geography	38	46	8	83.4	77.8	81.0	72.1		80.8
Electrical engineering	95	102=	7	67.6	76.5	78.8	74.9		73.0
Modern Languages	41=	47	6	81.5	77.4				80.3
Environmental science	66=	71=	5	82.6	78.2	81.6	81.6		81.7
architecture	44	48=	4	71.6	79.9	77.9	74.9		73.4
Mineral engineering	31	34	3	52.2	81.5	82.1	78.9		69.5
Physics	87=	90=	3	70.6	77.6	80.8	81.5		76.2
Pharmacy	63	65	2	68.5	79.1	82.4	88.1		77.9
Anthropology	42=	44=	2	78.6	74.8	73.7	67.3		76.6
Mathematics	95	96=	1	74.7	74.1	67.9	74.6		73.2

Subject	Academic	Employer	Citations	H	Score
Accounting and finance	7.0	-1.4	6.6	7.0	
Sports related subjects	-2.1	-4.3	-0.8	-4.1	

Chemistry	4.5	-3.6	-0.2	0.2	1.1
Sociology	4.4	-8.3	-3.4	-1.0	1.9
Life and medical sciences	-1.1	-4.2	3.2	-4.2	0.1
Biological sciences	2.7	-2.9	-0.3	-0.5	0.6
Medicine	-0.3	0.7	3.9	-9.3	-1.4
Geography	5.6	-4.3	5.9	1.9	4.1
Electrical engineering	9.0	-5.1	9.1	9.2	4.8
Modern Languages	0.7	0.1	0.0	0.0	0.5
Environmental science	0.5	-3.6	1.8	-2.2	-0.2
architecture	1.9	-5.6	3.4	5.1	1.6
Mineral engineering	13.3	-7.0	-0.2	-2.7	2.8
Physics	1.0	-2.9	3.4	0.5	0.6
Pharmacy	2.8	-1.0	0.7	0.1	1.2
Anthropology	1.0	-3.1	4.2	-2.1	0.6
Mathematics	2.3	-4.1	-2.3	-3.2	-1.0

The biggest increase in performance in individual subjects was in electrical engineering, which increased substantially in all indicators except for the employer reputation indicator. In all other indicators, this area experienced large increases in score, even though the overall increase in position was relatively small.

The employer reputation indicator suffered a decrease in almost all subjects this year, except for medicine. This is of course possibly explained by lower institutional visibility for areas that were not directly engaged in combatting the pandemic.

	Academic	Employer	Citations	H	Score
Net Totals	53.2	-60.6	35.0	-5.3	17.3
Max change	13.3	0.7	9.1	9.2	4.8
Min Change	-2.1	-8.3	-3.4	-9.3	-1.4
Mean change	3.1	-3.6	2.1	-0.3	1.2
Median change	2.3	-3.6	1.8	-0.5	0.6
IQR	3.8	2.0	4.0	4.1	1.6

Looking at the four indicators in an aggregated way, we can say that, among subjects that increased their position, they move increased in the academic reputation indicator. Almost all of them had reduced scores in employer reputation, and these scores were consistently lower than

2021. H index had the greatest and interquartile range of scores of the four, suggesting that it is significantly more volatile than the other indicators, but also is not especially determinant of performance in the ranking as a whole. "Citations" has a lower IQR and range, it is a more consistent indicator to target for performance in this ranking.

Subjects that lost position

Subject	2022	2021	Change	Academic	Employer	Citations	H	International	Score
Veterinary Science	41	40=	-1	72.9	89.8	80.2	81.1		79.2
Agricultural science	48=	46=	-2	61.5	75.4	81.8	89.1		72.5
Dentistry	15	13	-2	64.2	65.1	79.9	81.8		74.3
Natural sciences	77	75	-2	78.6	75.0	78.9	77.9	84.0	78.4
Petroleum engineering	32	29	-3	63.7	67.2	82.1	82.6		70.3
Law	51=	46=	-5	75.2	78.0	74.7	67.4		74.8
Business and management	97=	90=	-7	65.5	75.4	74.3	87.1		71.5
Chemical engingeering	81=	73	-8	70.6	78.5	80.5	76.6		75.4
Mechanical engineering	70=	61	-9	73.4	79.2	78.2	75.7		76.2
Engineering and technology	96=	86=	-10	78.2	75.2	76.7	73.6	78.0	76.7
Computer science	89=	79=	-10	59.0	79.5	69.6	69.9		68.4
Economics	137=	123=	-14	66.2	76.3	69.5	56.9		67.0
Social sciences and management	74=	52=	-22	78.1	74.5	75.1	66.3	57.3	74.9
Politics and international studies	51-100	50	-25	71.7	78.2	75.0	67.8		
Civil engineering	51-100	39=	-36	70.4	80.7	82.2	72.4		
Hospitality	51-100	37=	-38	53.0	43.9	55.2			

Subject	Academic	Employer	Citations	H	Score
Veterinary Science	-2.7	-2.7	1.4	-0.8	-0.9
Agricultural science	-2.6	-1.1	-1.6	2.9	-1.1
Dentistry	5.5	-23.5	-2.1	-12.2	-5.0
Natural sciences	-0.1	-4.8	0.8	-2.2	-0.7
Petroleum engineering	2.1	-2.1	-2.8	2.3	0.1
Law	1.4	-2.7	3.8	3.2	0.5
Business and management	0.7	-1.4	3.4	0.6	0.3
Chemical engingeering	4.1	-3.9	13.6	8.6	3.8
Mechanical engineering	9.2	-0.9	8.2	4.3	5.3
Engineering and technology	1.9	-4.9	1.9	0.9	0.0
Computer science	2.3	-2.7	-4.9	-7.8	-1.8
Economics	3.2	-2.0	-2.1	-4.4	-0.4
Social sciences and management	-0.9	-5.9	-2.4	0.9	-3.0
Politics and international studies	12.4	3.3	16.1	3.7	
Civil engineering	-3.5	-4.8	1.0	-4.5	
Hospitality	-5.4	-8.3	9.9	-47.2	

Interestingly, there were six areas that actually improved their scores despite losing position on this year's ranking. In the case of mechanical and chemical engineering, the increases were significant and similar to those of electrical engineering. This shows that in this case, the relative position of these subjects does not match the overall performance. Politics and international studies performed well in all indicators but still lost position in the ranking.

Employer reputation was also a serious challenge for all areas of knowledge, but this did not seem to have a strong influence on whether an area of knowledge rose or fell in the ranking.

	Academic	Employer	Citations	H	Score
Net Totals	27.6	-68.4	44.2	-51.7	-2.9
Max change	12.4	3.3	16.1	8.6	5.3
Min Change	-5.4	-23.5	-4.9	-47.2	-5.0
Mean change	1.7	-4.3	2.8	-3.2	-0.2
Median change	1.7	-2.7	1.2	0.7	-0.4
IQR	4.750	2.975	7.000	7.400	1.400

Compared to the areas of knowledge that rose, the only main difference that explained the different performance was academic reputation. Rising areas of knowledge increased their scores by 3.1 on average, compared to 1.7 for falling institutions. for employer reputation, citations and H index, the rising areas actually scored less on average than the areas of knowledge that fell.

Conclusion

Areas of knowledge that increase their positioning did it through improving their academic reputation score. Areas of knowledge should look to increase their internationalisation of research results. They should also consider increasing the visibility of research results though open access publication. Monitoring of graduates who go on to study or work at other institutions should also be considered a priority. Employer reputation fell for almost all areas of knowledge this year, and so should be seen as a priority.

Unicamp

Areas that improved their position

Unicamp have improved their position quite notably in many areas. Chemistry and chemical engineering have improved their position by six places each – this is not wholly surprising given that many of the publications in chemical engineering are also registered as chemistry on Scopus. Mathematics has improved significantly in position, as have electrical engineering and life and medical sciences.

Subject	2022	2021	Change	Academic	Employer	Citations	H	International	Score
Mathematics	124=	151-200	51	71.9	68.6	69.6	69.9		70.4
Materials Science	101-150	151-200	50	71.0	67.4	82.5	65.8		
Life and medical sciences	180	216=	36	76.1	70.0	73.7	50.0	65.6	68.7
Electrical engineering	91=	116	25	68.8	73.7	84.8	72.2		73.2
Sociology	100	101-150	25	73.4	73.3	68.2	57.8		70.8
Modern Languages	81=	88=	7	76.3	70.3				74.5
Chemical engingeering	81=	87	6	73.2	74.8	82.5	75.5		75.4
Chemistry	114	120=	6	72.6	75.3	75.8	62.0		71.7
Natural sciences	140=	143=	3	76.0	70.5	78.5	72.9	72.2	74.4
Agricultural science	47	49=	2	61.2	68.2	88.9	87.1		72.6

	Academic	Employer	Citations	H	Score
Mathematics	3.1	-2.6	-0.9	1.6	
Materials Science	7.4	-6.5	18.5	18.4	
Life and medical sciences	-1.7	-1.6	3.3	1.8	0.8
Electrical engineering	9.6	-1.7	6.4	12.9	6.2
Sociology	1.8	0.3	-1.6	1.6	
Modern Languages	0.8	-2.6	0.0	0.0	-0.2
Chemical engingeering	6.5	-1.8	12.5	8.7	5.2

Chemistry	3.0	-3.0	-0.9	-1.3	0.2
Natural sciences	1.0	-1.7	-0.3	-0.2	-0.4
Agricultural science	-1.6	0.1	-1.7	3.4	-0.5

For the areas of knowledge that rose most, the biggest increases were in academic reputation. There were also notable increases in both citations per paper and H index for materials science, electrical engineering and chemical engineering.

	Academic	Employer	Citations	H	Score
Net Totals	29.9	-21.1	35.3	46.9	11.3
Max change	9.6	0.3	18.5	18.4	6.2
Min Change	-1.7	-6.5	-1.7	-1.3	-0.5
Mean change	3.0	-2.1	3.5	4.7	1.6
Median change	2.4	-1.8	-0.1	1.7	0.2
IQR	4.8	1.0	6.5	7.0	3.3

Academic reputation was not the largest total factor for the areas of success at Unicamp – the mean change is lower than it was for H index or citations. It was, however, the most consistent factor in the areas of knowledge that increased their position, with a much higher median change – 2.4 compared to -0.1 or 1.7, respectively. This means that two areas that increased their scores by a lot in 2022 skew the data.

Areas in Unicamp that lost position in 2022

Subject	2022	2021	Change	Academic	Employer	Citations	H	International	Score
Petroleum engineering	31	28	-3	61.4	69.0	86.7	81.3		70.5
Physics	132=	129=	-3	66.1	72.2	79.9	77.0		72.3
Engineering and technology	139=	134=	-5	77.5	69.8	79.7	67.6	76.7	74.3
Computer science	118=	113	-5	59.4	74.5	69.2	64.9		66.2
Dentistry	32	26	-6	57.3	74.0	78.9	67.9		68.6
Mechanical engineering	124	107=	-17	68.5	76.1	78.3	66.7		72.0
Arts and Humanities	154=	135=	-19	76.8	70.6	63.3	51.3	31.7	70.4
Social sciences and management	199=	162	-37	71.8	67.7	76.0	57.7	45.3	68.5

Linguistics	151-200	101-150	-50	63.6	71.2	52.9	52.1		
Economics	251-300	201-250	-50	62.8	67.9	64.4	46.9		

Despite the areas of improvement, Unicamp lost significant position in arts and humanities and social sciences, as well as mechanical engineering, and two of its greatest strengths – dentistry and petroleum engineering.

	Academic	Employer	Citations	H	Score
Petroleum engineering	1.8	-4.1	-2.0	5.3	0.0
Physics	-0.1	-0.8	0.8	1.3	0.3
Engineering and technology	3.2	-2.5	0.6	1.9	1.2
Computer science	1.5	0.7	-5.6	-8.9	-1.4
Dentistry	0.2	0.4	-3.3	-18.6	-6.5
Mechanical engineering	8.5	3.3	7.2	3.2	6.0
arts and humanities	0.9	-3.1	-2.3	-1.6	-1.7
Social sciences and management	0.0	-2.6	-2.4	0.3	-2.1
Linguistics	2.0	-0.9	-3.9	-6.0	
Economics	3.7	-0.9	0.5	-5.1	

Mechanical engineering appears to be an anomaly in this section, given that it improved its indicator scores in all four indicators, and its overall score by 6 points, and still lost position. This suggests growing competition in the top of the ranking, rather than any real fall in performance.

	Academic	Employer	Citations	H	Score
Net Totals	21.7	-10.5	-10.4	-28.2	-4.2
Max change	8.5	3.3	7.2	5.3	6.0
Min Change	-0.1	-4.1	-5.6	-18.6	-6.5
Mean change	2.2	-1.1	-1.0	-2.8	-0.5
Median change	1.7	-0.9	-2.2	-0.6	-0.7
IQR	2.53	2.68	3.65	7.52	2.32

The areas of knowledge that lost position mostly lost them as a result of a drop in citations. While the H index seems to have fallen most, this is mostly explained by the fall in the score for dentistry. This means, that in order to protect and reinforce positions in this ranking, areas of knowledge should prioritise the number of citations per paper, especially given that larger drops in position were related to larger falls in this indicator, rather than any other factor.

Unesp

Subject	2022	2021	Change	Academic	Employer	Citations	H	International	Score
Modern Languages	201-250	251-300	50	65.3	64.7				
Electrical engineering	251-300	301-350	50	53.0	66.3	80.5	66.1		
Biological sciences	251-300	301-350	50	61.3	66.9	71.0	62.0		
Medicine	301-350	351-400	50	59.3	62.7	74.1	46.7		
Materials Science	251-300	301-350	50	60.9	70.4	78.4	59.0		
Business and management	351-400	401-450	50	44.7	66.7	79.7	75.9		
Life and medical sciences	279=	323=	44	73.4	65.5	65.5	45.2	60.6	64.1
Natural sciences	217=	224=	7	69.0	65.3	78.6	75.1	62.9	70.0

Unesp experienced significant success this year in moving up into the top 300 for life and medical sciences, with a large increase in position. Natural sciences also increased in position. Languages and business both moved up a group, as did medicine and biological sciences, and materials science and electrical engineering. It should be noted that the areas of growth appear to have come in thematically linked pairs, suggesting complementary areas of knowledge growing in symbiosis.

Subject	Academic	Employer	Citations	H	Score
Modern Languages	3.4	2.4	0.0	0.0	
Electrical engineering	13.2	1.9	9.0	13.6	
Biological sciences	4.3	-1.2	0.0	-1.8	
Medicine	-1.7	-11.1	16.1	-8.4	
Materials Science	15.4	41.0	11.1	11.1	
Business and management	3.5	2.4	5.1	0.0	
Life and medical sciences	-0.3	0.2	3.9	1.8	1.8
Natural sciences	3.5	-0.1	0.7	-0.2	0.1

The area of knowledge that has had the biggest increase in terms of performance is materials science. This increase was successful in terms of academic reputation, and in citations and H

index. Where this area has been most successful, by a long distance, is in improving its score in employer reputation. In a year where almost all employer reputation scores fell, and the second largest rise was 2.4, materials science rose by 41 points. This increase should be studied as an example to promote to other engineering and technology subjects.

Subject	Academic	Employer	Citations	H	Score
Net Totals	41.3	35.5	45.9	16.1	1.9
Max change	15.4	41.0	16.1	13.6	1.8
Min Change	-1.7	-11.1	0.0	-8.4	0.1
Mean change	5.2	4.4	5.7	2.0	0.9
Median change	3.5	1.1	4.5	0.0	0.9
IQR	4.05	2.78	9.00	4.73	0.85

The greatest increases for Unesp's areas of knowledge came in citations. Unlike USP and Unicamp, whose biggest gains were in academic reputation, it seems that Unesp has found it easier to raise its citations per paper.

Subjects that lost position

Subject	2022	2021	Change	Academic	Employer	Citations	H	International	Score
Engineering and technology	308=	304	-4	68.8	64.9	77.1	63.4	59.9	67.0
Dentistry	36	22=	-14	57.1	64.4	78.9	68.9		67.9
Social sciences and management	357=	340=	-17	64.0	65.9	73.9	54.0	34.1	63.1
arts and humanities	327=	304=	-23	67.5	68.8	55.8	44.2	27.6	63.1
Archaeology	201-230	151-200	-40	55.4	62.0	51.7	50.4		

By contrast, there are fewer areas that showed significant decline in position this year. Only engineering, dentistry, social sciences, arts and humanities and archaeology went down in position.

	Academic	Employer	Citations	H	Score

Engineering and technology	5.7	-0.8	2.1	5.7	2.1
Dentistry	-1.4	-13.6	-3.2	-16.4	-7.7
Social sciences and management	1.3	-1.5	-3.6	6.0	-1.0
arts and humanities	2.1	-1.5	-0.1	-1.3	-0.3
archaeology	-3.8	-7.9	1.4	6.2	

Most of the decreases in indicator score were relatively small, except for larger declines in employer reputation and H index for dentistry.

	Academic	Employer	Citations	H	Score
Net Totals	3.9	-25.3	-3.4	0.2	-6.9
Max change	5.7	-0.8	2.1	6.2	2.1
Min Change	-3.8	-13.6	-3.6	-16.4	-7.7
Mean change	0.8	-5.1	-0.7	0.0	-1.7
Median change	1.3	-1.5	-0.1	5.7	-0.6
IQR	3.50	6.40	4.60	7.30	2.97

Among the subjects that declined, we can see that on average, academic reputation and H index improved, but employer reputation declined notably, and citations a little less. In order to protect ranking position, Unesp should look to improve employer reputation scores.

Conclusion

This year, the performance of state universities in São Paulo was relatively stable. In general terms, there were more advances in areas of knowledge than losses. In the reputation indicator, along with the employer reputation indicator, there is a notable drop in performance this year. Therefore, the relationship with external society must be a priority for universities. Academic reputation with peers and the external community remains by far the biggest determinant of performance on the QS Subject.