URAP 2021-2022 WORLD UNIVERSITY SUBJECT RANKING
PRESS RELEASE
URAP (University Ranking by Academic Performance)
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URAP Laboratory is a non-profit organization established at the Informatics Institute of the Middle East Technical University, Turkey in 2009.

URAP team members are METU researchers voluntarily participating in URAP Research Laboratory as a public service. The main objective of URAP is to rank the world universities based on academic performance indicators that reflect the quality and the number of their scholarly publications. In line with this objective, URAP has been annually releasing the World Ranking of Higher Education Institutions since 2010 and Field Rankings since 2011. As of 2018, URAP has increased the number of universities in the world university general rankings from 2,500 to 3,000. Recently in 2022, the number of subjects in the world university subject ranking increased from 62 to 78.

URAP (University Ranking by Academic Performance) Research Laboratory; also ranks Turkish Universities among themselves.

Introduction

Research & development, international competition as well as collaboration have become high-priority items on the agenda of most universities around the world. All universities need to know where they stand among other universities in the world to evaluate their current academic Performance. With that information they can develop strategic plans to strengthen their progress more easily. To address this need, several ranking systems have been proposed since 2003, including ARWU-Jiao Tong (China), THE (United Kingdom), Leiden (The Netherlands), QS (United Kingdom), Webometrics (Spain), HEEACT/NTU (Taiwan) and SciMago (Spain) which rank universities worldwide based on various indicators. The use of bibliometric data obtained from widely known and credible information resources such as Web of Science, Scopus, and Google Scholar has contributed to the objectivity of these ranking systems.

Nevertheless, most ranking systems cover up to the top 700-1000 universities worldwide, representing institutions mostly located in developed countries. Universities in other countries also deserve and need to know where they stand among different institutions at global and national levels. This motivated the URAP team to develop a multi-criteria ranking system that is more comprehensive in coverage so that more universities will have a chance to observe the state of their academic progress.

Aim and Scope

For World university general rankings and subject rankings URAP focuses on academic quality. For general rankings, URAP gathered data for 3,500 Higher Education Institutes (HEI) with the highest number of articles in 2021 to rank these organizations by their academic performance. The overall score of each HEI is based on its performance over several indicators described in the Ranking Indicators section. The ranking includes HEIs except for governmental institutions, e.g., the Chinese Academy of Science and the Russian Academy of Science. Universities without undergraduate programs or with only one faculty were not ranked. The data for 3,500 HEIs is processed, and the top 3,000 of them are scored for the general ranking of world universities. Thus, URAP covers approximately 15% of all HEIs globally, for general rankings making it one of the most comprehensive university ranking systems in the world.

For subject ranking, 78 subjects are covered. URAP ranking system for general and subject rankings is entirely based on objective data obtained from reliable open sources. The system ranks the universities according to multiple criteria. As of 2017, URAP employed a new filter for the article and citation indicators to promote publication quality by focusing on articles published in journals listed within the first, second, and third quartiles (Q1, Q2, and Q3) regarding their Journal Impact Factor within their respective subject areas.

The number of articles published in specific fields can vary greatly. For example, the number of articles published in the world in the field of Law is well below the number of scientific articles in the field of Physics. For this reason, the number of universities in the 2020-2021 URAP World field ranking is determined according to the threshold values determined depending on the publication density in the fields where their publications are located. For example, 50 universities in Law and 1,000 universities in Physics are listed. Some universities are not taken into consideration, not because they do not have publications in the relevant field, but because the number of publications did not exceed the threshold value in that field. The goal of the URAP ranking system is not to label world universities as the best or

the worst. Instead, our intention is to help universities identify their potential areas of progress concerning specific academic performance indicators. Like other ranking systems, the URAP system is neither exhaustive nor definitive and is open to new ideas and improvements.

This year, the calculation methodology is partly changed for the URAP world university subject ranking. Because we detected that some universities (around 250-300) in the URAP rankings tended toward mainly one subject. As a result, they were ranked unfairly in the rankings with the number of publications approximately 5-10 times higher than the world averages in that subject. In order to prevent this inconsistency, the following formulation has been developed.

World Field Ranking Formulation (2021-2022)
1. 78 subjects have been determined for the 2021-2022 field ranking of URAP.
2. For each of these 78 subjects, the number of articles for 5 years (2016-2021) in that subject was calculated. (STA_{world})
3. The total number of articles in the world (5 years) was found. (TA_{world})
4. For each of these 78 subjects, the number of articles in that subject (5 years) was calculated, and its ratio to the total number of articles in the world (5 years) was calculated.
5. Three times the calculated ratio for each area was set as the limit value. (Limit value = $((STA_{world})i/TA_{world})*3$) $0<i<79$
The ratio of the number of articles to the total number of articles of the relevant university was calculated.
7. In these calculations, the number of articles for the last 5 years was taken into account and the calculations were repeated for 78 fields.
8. If the rate of articles published by a university on a subject exceeds the limit value of that subject determined for the world and this limit value was over 40%, the total number of articles of that university is multiplied by the limit value of the relevant subject and accepted as the number of articles in the relevant subject.
(Subject Ratio$_{university}$> Limit Value$i$ & Limit Value$i$ > 40% → ($STA_{university}$)i = $TA_{university}$ * Limit Value$i$) $0<i<79$
9. If the rate of articles published by a university in a field of science exceeds the limit value of that subject determined for the world and this limit value is below 40%, 40% of the total number of articles of that university was accepted as the number of articles in the related subject.
(Area Ratio$_{university}$ > Boundary Value$i$ & Boundary Value$i$ < 40% → ($STA_{university}$)i = $TA_{university}$ * 0.40) $0<i<79$
10. If the rate of articles published by a university on a subject does not exceed the limit value of that subject determined for the world, no change has been made. (Subject Ratio$_{university}$ ≤ Boundary Value → no action was taken) $0<i<79$

As a result of the ranking made with this arrangement, only the universities in 51 countries were affected. A total of 286 among 2514 universities all over the world were affected (Table 1).

Table 1. Number of universities affected in 51 countries by the new algorithm of URAP Ranking

	Country	Number of universities affected by the changes
1	CHINA MAINLAND	83
2	JAPAN	31
3	FRANCE	20
4	USA	19
5	INDIA	18
6	RUSSIA	12
7	BRAZIL	9
8	CZECH REPUBLIC	8
9	ITALY	6
10	NORWAY	5
11	IRAN	5
12	UK	4
13	TURKEY	4
14	CANADA	4
15	POLAND	4
16	GERMANY (FRG)	3
17	PAKISTAN	3
18	AUSTRIA	3
19	SOUTH KOREA	3
20	THAILAND	2
21	TAIWAN	2
22	EGYPT	2
23	SCOTLAND	2
24	TANZANIA	2
25	ARGENTINA	2
26	CHILE	2
27	SPAIN	2
28	SWEDEN	2
29	MALAYSIA	2
30	ETHIOPIA	1
31	BULGARIA	1
32	UKRAINE	1
33	ECUADOR	1
34	SWITZERLAND	1
35	PORTUGAL	1

36	TUNISIA	1
37	QATAR	1
38	VIETNAM	1
39	ROMANIA	1
40	IRAQ	1
41	GREECE	1
42	ESTONIA	1
43	BELARUS	1
44	BANGLADESH	1
45	SINGAPORE	1
46	NEPAL	1
47	SLOVAKIA	1
48	FINLAND	1
49	SOUTH AFRICA	1
50	DENMARK	1
51	INDONESIA	1
	The total number of universities affected	**286**

The list of 31 subjects and related universities affected by the new algorithm of URAP is given in Table 2.

Table 2. List of 31 subjects and number of related universities affected by the new algorithm of URAP

	Subject	The number of universities affected
1	Medical and Health Sciences	56
2	Biological Sciences	40
3	Mechanical Engineering	35
4	Engineering	31
5	Physical Sciences	25
6	Electrical & Electronics Engineering	25
7	Chemical Engineering	25
8	Agriculture	22
9	Economics	21
10	Materials Engineering	17
11	Chemical Sciences	12
12	Commerce, Management, Tourism and Services	10
13	Environmental Sciences	7
14	Information & Computing Sciences	5

15	Mathematical Sciences	4
16	Earth Sciences	4
17	Studies in Human Society	3
18	Veterinary Sciences	3
19	Geology	3
20	Technology	3
21	Psychology and Cognitive Sciences	2
22	Business	2
23	Dentistry	2
24	Psychology	1
25	Law and Legal Studies	1
26	Marine Sciences & Technology	1
27	Pharmacology	1
28	Environmental Engineering	1
29	Optics	1
30	Education	1
31	Human Movement & Sports Sciences	1
	Toplam Üniversite Sayısı	**365**

World Ranking Indicators

URAP 2020-2021 World University Subject Ranking is based on six academic performance indicators. Since URAP is an academic performance-based ranking, publications constitute the basis of the ranking methodology. Both quality and quantity of publications and international research collaboration performance are used as indicators. The indicators, the data sources, and the duration of coverage are summarized in the table below.

Indicator	Objective	Coverage	Source
Article	**Current Scientific Productivity**	**2021**	**InCites**
Citation	**Research Impact**	**2017-2021**	**InCites**
Total Document	**Scientific Productivity**	**2017-2021**	**InCites**
Article Impact Total	**Research Quality**	**2017-2021**	**InCites**
Citation Impact Total	**Research Quality**	**2017-2021**	**InCites**
International Collaboration	**International Acceptance**	**2017-2021**	**InCites**

The details of calculating Article Impact Total and Citation Impact Total are given on URAP's web page (https://urapcenter.org/Rankings/2021-2022/fields).

Data Collection & Scoring

For 2020-2021 Subject Ranking data was gathered from Web of Science and InCites. We combined the sub-headings in the Web of Science Categories field with 78 upper fields and rank them accordingly. The main lists of these fields that can be reached from the addresses are given below.
https://urapcenter.org/Rankings/2021-2022/fields

Web of Science uses two different terms "category" and "research area" Their explanation is given below. "Journals and books covered by Web of Science Core Collection are assigned to at least one Web of Science category. Each Web of Science category is mapped to one research area." The reliability of ranking depends mainly on the quality of the data used. To provide reliable data, preprocessing and data cleaning techniques were employed. Statistical analysis indicated that the raw bibliometric data underlying our indicators had highly skewed distributions. Therefore, the indicator values above and below the median are linearly scored in two groups. The Delphi system was conducted with a group of experts to assign weighting scores to the indicators. A total score of 600 is distributed to each indicator as follows:

- Article: %21
- Total Document: %10
- Citation: %21
- Article Impact Total: %18
- Citation Impact Total: %15
- International Collaboration: %15

For university candidates, world subject rankings are critical in their university preferences to study abroad. All over the world, university administrators, academics, students and parents, and press and media organs monitor world rankings closely. Ranking results are frequently featured in the media and social media. The universities, which have been criticized for their insufficient academic production, have begun to highlight scientific publication and citation issues in their strategic plans. Especially the universities in developing countries have started to give importance to the scientific articles of the candidates and the number of citations they received in terms of appointment and promotion criteria to rise in the rankings. For this reason, the URAP team deemed it necessary to increase the number of fields to 78 in the world subject rankings to provide detailed information to candidates and universities. In addition, some universities that focus on a specific field such as Social Sciences and Fine Arts seem to be behind in the general rankings. By increasing the number of subjects in the URAP rankings, we hope to help successful universities focus on sub-fields to stand out.

The universities in developed countries such as the USA, Netherlands, UK, France, Australia, Switzerland, Canada, and China have been at the top of most subjects of URAP world subject rankings. On the other hand, universities in developing countries take place in relatively few subjects. Unfortunately, universities, in some developing countries couldn't enter any of the 78 subject ranking lists in 2022. The main reason underlying this situation is that many academicians in developing countries cannot publish scientific articles in internationally respected journals.

Unfortunately, although it is claimed to be scientific in recent years, many journals operating primarily for commercial purposes, and scientific standards are kept in the background have emerged. The articles published in these journals cannot be cited because scientists do not read them. Many academics at universities in some developing countries publish articles in such journals with low or zero impact value. Therefore, universities whose academics tend to such journals cannot take place in world rankings. Universities that want to enter the world's general and subject rankings or rise to higher levels in these rankings should increase the number of articles in journals with high impact value and not publish articles in journals with low or zero impact value. Especially, the number of citations per publication decreases as the number of uncited articles increases, pushing the university down in the rankings since the number of citations per publication is a crucial indicator like the number of articles in the rankings. Accordingly, universities that can prevent academics from publishing articles in journals with low impact will increase their chances of being ranked higher in rankings based on scientific productivity and publication quality.

EVALUATION OF URAP 2021-20222 URAP SUBJECT RANKING RESULTS

Top world universities

The current assessment presented in this report has shown that US and Chinese universities both ranked first in 28 of the 78 subject areas. Last year in URAP 2020-2021 ranking, China ranked first in the world in 21 subjects while the US ranked first in the world in 18 subjects. This year UK ranked first in 9 subjects and Netherland ranked first in 7 subjects. Brazil, Hong Kong, and France are ranked first in 2 subjects each. Harvard University became first in 21 subjects while Tsinghua University in China Mainland became first in 13 subjects. Among Chinese universities, the China University of Geosciences became first in 3 subjects while Tongji University became first in 2 subjects. This year in the 78 subjects listed, the first places were shared by 7 countries while In the previous ranking, the first places were shared among 9 countries.

Table 3 lists the number of countries and universities ranked first in the 2021-2022 URAP subject ranking.

Table 3. The number of countries and universities ranked first in the 2021-2022 URAP subject ranking

Country/University/Subject	Number of first place in the world
USA	**28**
Harvard University	**21**
Pharmacology	1
Molecular Biology & Genetics	1
Statistics	1
Biomedical Engineering	1
Oncology	1

Chemical Sciences	1
Psychology and Cognitive Sciences	1
Clinical Neurology	1
Biological Sciences	1
Dentistry	1
Neurosciences	1
Economics	1
Pediatrics	1
Education	1
Psychology	1
Geriatrics & Gerontology	1
Public, Environmental & Occupational Health	1
Human Movement & Sports Sciences	1
Surgery	1
Immunology	1
Medical and Health Sciences	1
University of Colorado Boulder	**1**
Meteorology & Atmospheric Sciences	1
University of Pennsylvania	**1**
Nursing	1
University of Michigan	**1**
Women's Studies	1
Massachusetts Institute of Technology (MIT)	**1**
Mathematical Sciences	1
Johns Hopkins University	**1**
Infectious Diseases	1
University of Washington Seattle	**1**
Marine Sciences & Technology	1
University of California Los Angeles	**1**
Ethnic Studies	1
CHINA MAINLAND	**28**
Tsinghua University	**13**
Materials Engineering	1
Sustainable & Renewable Energy	1
Nanoscience & Nanomaterials	1
Chemical Engineering	1
Artificial Intelligence	1
Electrical & Electronics Engineering	1
Mechanical Engineering	1
Energy & Fuels	1
Robotics & Intelligent Systems	1

Engineering	1
Technology	1
Environmental Engineering	1
Information & Computing Sciences	1
China University of Geosciences	**3**
Archeology	1
Geology	1
Earth Sciences	1
Tongji University	**2**
Civil Engineering	1
Architecture	1
Beihang University	**1**
Aerospace Engineering	1
University of Science & Technology Beijing	**1**
Metallurgy Engineering	1
Southeast University - China	**1**
Transportation Science & Technology	1
Hohai University	**1**
Water Resources	1
Huazhong University of Science & Technology	**1**
Optics	1
University of Electronic Science & Technology of China	**1**
Telecommunications	1
Jiangnan University	**1**
Food Engineering	1
Wuhan University	**1**
Library & Information Science	1
Shanghai Jiao Tong University	**1**
Industrial & Manufacturing Engineering	1
South China University of Technology	**1**
Polymer Science	1
UK	**9**
University of Oxford	**6**
Political Science	1
Studies in Human Society	1
Sociology	1
Law and Legal Studies	1
International Relations	1
Philosophy	1
University College London	**2**
Ophthalmology	1

Anthropology	1
University of Cambridge	**1**
History	1
NETHERLANDS	**7**
University of Amsterdam	**4**
Studies in Creative Arts and Writing	1
Language, Communication and Culture	1
Film & Digital Media	1
Journalism	1
Wageningen University & Research	**2**
Environmental Sciences	1
Agriculture	1
Delft University of Technology	**1**
Urban Planning	1
BRAZIL	**2**
Universidade de Sao Paulo	**2**
Zoology	1
Veterinary Sciences	1
HONG KONG	**2**
Hong Kong Polytechnic University	**2**
Commerce, Management, Tourism and Services	1
Business	1
FRANCE	**2**
Universite Paris Saclay	**1**
Physical Sciences	1
Universite de Paris	**1**
Astronomy & Astrophysics	1

Table 4 summarizes the achievements of countries in 78 areas. In the table, it can be seen how many subjects the countries are ranked in and how many universities of each country are in these Science fields. In URAP's 2021-2022 field ranking, universities from 113 different countries were included in at least one subject ranking this year. The total number of universities in at least one subject ranking in 2022 increased from 1,752 to 2,514 compared to the 2021 ranking results. While China's 388 universities were included in at least one subject ranking, the number of universities in the USA with at least one ranking remained at 329. Japan followed China and the USA with 140 universities. While Turkey had 31 universities in the field ranking last year, 83 Turkish universities managed to take place in at least one ranking in the 2021-2022 field ranking.

As seen in Table 4; Australia, Canada, UK, and the USA are the only countries having at least one university which succeeded to take place in all 78 subjects in the 2021-2022 URAP world university subject ranking.

Table 4. Success of countries in 2021-2022 URAP subject ranking

Country	Number of Universities that took place in the rankings	Number of subject rankings that the countries took place
ALGERIA	6	13
ARGENTINA	12	39
AUSTRALIA	39	78
AUSTRIA	13	65
BAHRAIN	1	1
BANGLADESH	6	5
BELARUS	1	6
BELGIUM	10	75
BOSNIA & HERZEGOVINA	3	1
BOTSWANA	1	1
BRAZIL	89	66
BRUNEI	1	1
BULGARIA	5	6
CAMEROON	1	10
CANADA	52	78
CHILE	25	50
CHINA MAINLAND	388	70
COLOMBIA	14	25
COSTA RICA	2	6
CROATIA	4	38
CUBA	1	2
CYPRUS	4	12
CZECH REPUBLIC	17	57
DEMOCRATIC REPUBLIC OF THE CONGO	1	1
DENMARK	7	75
ECUADOR	1	2
EGYPT	28	37
UK	89	78
ESTONIA	4	27
ETHIOPIA	8	11
FINLAND	10	73
FRANCE	76	69
GERMANY (FED REP GER)	71	75
GHANA	3	9
GREECE	16	49
HONG KONG	6	69

HUNGARY	11	36
ICELAND	2	20
INDIA	124	41
INDONESIA	8	13
IRAN	62	58
IRAQ	2	4
IRELAND	9	58
ISRAEL	7	70
ITALY	69	72
JAMAICA	1	1
JAPAN	140	60
JORDAN	6	12
KAZAKHSTAN	2	10
KENYA	4	7
KUWAIT	1	6
LATVIA	2	6
LEBANON	5	12
LITHUANIA	6	20
LUXEMBOURG	1	20
MACAU	2	33
MACEDONIA	1	1
MALAWI	1	4
MALAYSIA	24	52
MALI	1	1
MALTA	1	2
MAURITIUS	1	1
MEXICO	18	51
MOROCCO	6	15
MOZAMBIQUE	1	1
NAMIBIA	1	1
NEPAL	3	6
NETHERLANDS	13	77
NEW ZEALAND	7	67
NIGERIA	12	7
NORTHERN IRELAND	2	45
NORWAY	16	74
OMAN	1	11
PAKISTAN	19	28
PALESTINIAN TERRITORIES	2	1
PARAGUAY	1	1
PERU	3	5

PHILIPPINES	4	4
POLAND	46	50
PORTUGAL	20	67
QATAR	2	32
REUNION	1	5
ROMANIA	15	20
RUSSIA	32	35
RWANDA	1	1
SAUDI ARABIA	22	53
SCOTLAND	15	70
SENEGAL	1	2
SERBIA	4	41
SINGAPORE	4	74
SLOVAKIA	8	19
SLOVENIA	3	38
SOUTH AFRICA	19	59
SOUTH KOREA	73	67
SPAIN	63	76
SRI LANKA	5	4
SUDAN	1	3
SWEDEN	28	75
SWITZERLAND	14	74
TAIWAN	49	60
TANZANIA	2	5
THAILAND	20	35
TUNISIA	10	29
TURKEY	83	46
UGANDA	2	10
UKRAINE	2	10
UNITED ARAB EMIRATES	5	25
USA	329	78
VENEZUELA	1	1
VIETNAM	9	27
WALES	6	59
ZAMBIA	1	4
ZIMBABWE	1	5

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As Middle East Technical University Informatics Institute URAP Laboratory team; we hope that the URAP 2021-2022 world university subject ranking can help universities in developing countries to step up in the following university rankings.

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