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Unveiling University Groupings: A Clustering Analysis for Academic Rankings †

George Matlis [1], Nikos Dimokas [1,*] and Petros Karvelis [2,*]

[1] Department of Informatics, University of Western Macedonia, 52100 Kastoria, Greece; giorgos_matlis@hotmail.com
[2] Department of Informatics and Telecommunications, University of Ioannina, 47100 Arta, Greece
* Correspondence: ndimokas@uowm.gr (N.D.); pkarvelis@uoi.gr (P.K.)
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Abstract: The evaluation and ranking of educational institutions are of paramount importance to a wide range of stakeholders, including students, faculty members, funding organizations, and the institutions themselves. Traditional ranking systems, such as those provided by QS, ARWU, and THE, have offered valuable insights into university performance by employing a variety of indicators to reflect institutional excellence across research, teaching, international outlook, and more. However, these linear rankings may not fully capture the multifaceted nature of university performance. This study introduces a novel clustering analysis that complements existing rankings by grouping universities with similar characteristics, providing a multidimensional perspective on global higher education landscapes. Utilizing a range of clustering algorithms—K-Means, GMM, Agglomerative, and Fuzzy C-Means—and incorporating both traditional and unique indicators, our approach seeks to highlight the commonalities and shared strengths within clusters of universities. This analysis does not aim to supplant existing ranking systems but to augment them by offering stakeholders an alternative lens through which to view and assess university performance. By focusing on group similarities rather than ordinal positions, our method encourages a more nuanced understanding of institutional excellence and facilitates peer learning among universities with similar profiles. While acknowledging the limitations inherent in any methodological approach, including the selection of indicators and clustering algorithms, this study underscores the value of complementary analyses in enriching our understanding of higher educational institutions' performance.

Keywords: clustering of universities; clustering; K-means; GMM; agglomerative; fuzzy C-means; Quacquarelli Symonds

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1. Introduction

Finding a distinguished university is a critical step in securing a high-quality education, offering students a sturdy foundation of knowledge, skills, and credentials. Furthermore, it can lead to heightened career prospects post-graduation, as employers tend to favor graduates from prestigious universities, often translating into more enhanced job opportunities. These esteemed universities offer students the chance to participate in cutting-edge research, gain invaluable experiential insights, and cultivate essential skill sets crucial for their forthcoming endeavors.

Evaluating and ranking universities is a complex and multifaceted process that involves careful consideration of various indicators to ensure an objective and precise assessment. Leading ranking organizations, such as the Academic Ranking of World Universities (ARWU) [1], Quacquarelli Symonds (QS) [2], and Times Higher Education World University Rankings (THE) [3], employ sophisticated algorithms to evaluate universities based on a

wide range of factors, including academic reputation, faculty–student ratio, academic citations, and international diversity. Each indicator is assigned a specific weight to reflect its relative importance in the university evaluation process. According to [4], an examination of these indicators reveals the following:

- The low similarity of indicators across ranking lists implies that organizations primarily rely on distinct sets of criteria when assessing universities.
- The weight assigned to indicate the significance of an indicator can vary across different ranking lists.
- The research production and impact-related indicators are similar among ranking lists.

University rankings not only aid students in making informed decisions, but also incentivize universities to enhance their performance in critical domains like research, teaching, and internationalization, all of which are essential to their stakeholders. While these rankings offer significant benefits, they are not without limitations, including the following:

- **Subjectivity**—The choice of indicators and their associated weights may rely on subjective and contentious criteria, resulting in rankings that do not accurately reflect the genuine capabilities and performance of universities.
- **Narrow Focus**—The indicators employed in ranking systems might fall short of encompassing the entire spectrum of activities and outputs of universities, potentially resulting in a limited and partial assessment of their performance. For instance, rankings primarily centered around research productivity may not adequately gauge the quality of teaching or the broader impact of universities on their local communities.
- **Incentive Distortion**—Ranking systems can incentivize universities to prioritize specific activities over others, potentially distorting their original missions and objectives.
- **Lack of Transparency**—The lack of transparency in the methodology and data sources employed by ranking organizations poses a challenge for universities to pinpoint and address areas for improvement. Additionally, this opacity may foster skepticism and mistrust among stakeholders towards the reliability of the rankings.

Recognizing the limitations of existing ranking systems, this study is motivated by the pursuit of a complementary analytical approach. By employing clustering algorithms to group universities based on similar characteristics, we aim to provide a more nuanced perspective on the global higher education landscape. This clustering analysis is not intended to replace traditional rankings but to augment them, offering interested parties an alternative approach for viewing and assessing the strengths and similarities among groups of universities. Such an approach acknowledges the diversity of university missions and the importance of multiple factors in determining institutional success, thus encouraging a more holistic and collaborative understanding of educational excellence. Our motivations are rooted in the belief that a multidimensional analysis can facilitate more informed decision-making for students, educators, policymakers, and institutions alike, promoting a richer dialogue about the qualities that define leading universities worldwide. This approach may also be preferable to a straightforward ranking of universities from top to bottom for several compelling reasons, such as the following:

- **A limitation of criteria**—Ranking methodologies often rely on a narrow set of criteria for assessing university performance, yet certain universities excel in diverse domains of expertise. Consequently, employing clustering methods can highlight their individual strengths and areas of excellence.
- **Diverse needs**—Every individual harbors distinct priorities when it comes to selecting a university, encompassing factors like expenses, geographic location, and available academic programs.
- **Avoiding Stigma**—Establishing a ranking hierarchy where universities are sorted from the best to the worst can result in the marginalization of lower-ranked institutions. To alleviate this effect and promote a more constructive and inclusive view of universities, clustering them based on specific attributes or areas of expertise can be a valuable alternative.

The remainder of the article is organized as follows: In Section 2, we review other related studies, while Section 3 presents the dataset and the data pre-processing phase. Section 4 presents the methodology, and finally, Section 5 concludes our study.

2. Related Work

Clustering is a machine learning technique that belongs to the category of unsupervised learning and aims to group related objects together into distinct clusters. There are several different types of clustering, each with their own benefits and drawbacks. Some of the types of clustering are as follows:

- **Hierarchical**—Utilizing this methodology, clusters are structured within a dendritic, tree-like arrangement, in which each smaller cluster serves as a subset of a more comprehensive cluster. Two fundamental modes of hierarchical clustering are evident: agglomerative [5] and divisive [6]. Within the agglomerative clustering technique, each data point originates within its own distinct cluster, culminating in the eventual amalgamation of all clusters into a unified entity. Conversely, the divisive clustering method commences with all data points situated within a solitary cluster, subsequently undergoing incremental partitioning into smaller clusters through the algorithm.
- **K-Means**—One widely employed clustering method is K-Means clustering [7]. In this technique, the dataset is partitioned into K clusters, where K is a modifiable parameter. The objective is to minimize the total sum of squared distances between each data point and its designated cluster center.
- **Fuzzy Clustering**—This approach enables data points to exhibit multiple degrees of membership across multiple clusters. Among the field, Fuzzy C-Means (FCM) clustering [8] stands as the most widely utilized algorithm for fuzzy clustering.
- **Density-Based**—The density-based clustering technique involves the grouping of data points that are in close proximity within high-density regions, while being separated by regions of lower density. Among these methods, DBSCAN [9], which stands for "Density-Based Spatial Clustering of Applications with Noise", is the most widely recognized density-based clustering algorithm.
- **Model-Based**—This methodology posits a mixture of probability distributions as the origin of the data points. Among model-based clustering techniques, the Gaussian Mixture Model (GMM) algorithm [10] stands as the most prevalent and widely employed approach.

Considerable research has been undertaken in the field of evaluating and ranking academic institutions, spanning universities, departments, and diverse academic domains.

A renowned technique employed for the evaluation of university rankings is rank fusion [11]. Rank fusion, also referred to as meta-ranking, constitutes a procedure for amalgamating the outcomes of multiple university rankings, which include assessments based on multiple factors and criteria, thereby yielding a more encompassing and dependable overall ranking. The process of rank fusion entails the normalization of diverse rankings and their amalgamation through a weighted averaging mechanism, wherein the assigned weights quantify the significance attributed to each respective ranking.

In contrast to individual ranking systems, the process of rank fusion presents several advantages. It fosters a greater degree of stability and dependability in the rating system, diminishing the impact of outliers or inaccuracies within individual rankings. Additionally, it possesses the capacity to consider a broader spectrum of factors or perspectives, thereby furnishing a more comprehensive assessment of the performance or quality of the ranked entities. However, it is imperative to exercise caution when employing rank fusion, as the weights applied to amalgamate the rankings may carry a degree of subjectivity or bias.

A useful method for ranking universities is the Borda Count method [12]. The Borda Count method is a single-winner, voting-based technique for aggregating and consolidating rankings from different sources or criteria. In this method, each university is assigned a score in each individual ranking, typically based on its position in that ranking. The scores are then summed across all rankings, and universities are ranked based on their total scores.

The higher a university ranks in an individual ranking, the more points it receives. The Borda Count allows for the integration of diverse indicators into a single composite ranking. It is particularly useful when dealing with university rankings from various organizations, as it provides a way to balance and combine these rankings to create a unified assessment of university performance that reflects the collective preferences of the rankings.

There exists a multitude of scholarly investigations concerning the ranking of universities, drawing inspiration from conventional methodologies such as Data Envelopment Analysis (DEA) [13,14], multicriteria sorting [15], the application of the Pareto Front [16], as well as the aforementioned rank fusion technique. Nevertheless, it is important to acknowledge that each university ranking entity may adopt a distinct ranking framework or devise proprietary methodologies to appraise the performance of individual universities, thereby yielding divergent ranking lists.

For our study, we relied on [17], although [18] is very similar to our analysis. In [17], the authors clustered the top 500 universities from the National Taiwan University (NTU) ranking list. The NTU ranking list is based on eight validated research performance indicators, organized into three main categories, each with a corresponding weight:

- **Research productivity**—25%
- **Research impact**—35%
- **Research excellence**—40%

The outcomes of their clustering experiments, involving 12 and 43 clusters, utilizing the DBSCAN, EM (Expectation-Maximization) [19], and K-Means algorithms, demonstrated a strong similarity to the ranking provided by the NTU ranking list. This similarity was notably pronounced with the EM and K-Means algorithms, while the DBSCAN algorithm did not yield comparable results. Within the 12 and 43 clusters derived from their analysis, a singleton cluster emerged at the top, containing a single university recognized for its exceptional performance. As a result, they concluded that K-Means stands out as the most suitable algorithm for university clustering.

In the study [18], the dataset from Quacquarelli Symonds (QS) for the year 2022 served as the basis for clustering and analysis. The author employed six score indicators, elaborated in Section 3, and opted for GMM as the primary clustering algorithm. Differing from the eight research-oriented indicators employed in [17], the QS indicators encompass a broader spectrum of criteria for evaluating university performance. The determination of the optimal number of clusters, set at four, was accomplished using Akaike's Information Criteria (AIC) [20] and Bayesian Information Criteria (BIC) [21]. In contrast to QS's existing ranking system, the study's findings introduced a novel classification scheme for universities, where each cluster portrayed universities in a manner distinct from their assigned rankings in the QS list.

In [22], the authors classified the top 500 universities into 21 types according to their disciplinary characteristics, using data from the Institute of Higher Education, Shanghai Jiao Tong University. The indicators used for the classification are the percentage of publications in six broad disciplinary areas:

1. Arts/Humanities and Social Sciences
2. Natural Sciences and Mathematics
3. Engineering/Technology and Computer Sciences
4. Life Sciences
5. Clinical Medicine
6. Interdisciplinary and Multidisciplinary Sciences

Universities were categorized based on their focus, priority, and orientation with specific disciplinary groups. The universities that did not fall into any of the aforementioned categories were designated as "balanced". An examination was conducted to assess the distribution of various types of universities across nations and ranking systems. In the clustering procedure, a customized algorithm was employed, utilizing the Squared Euclidean Distance as the similarity metric.

There are other notable studies related to our work of clustering universities, such as those in [23–26]. In [23], the object of research is the internal structure of management in universities, its relationship to rating, and the clustering of universities in the Republic of Kazakhstan in order to determine the effectiveness of management. The authors considered three clustering models, each of which presented intriguing results regarding the clustering parameters and their values. In [24], to enable a more suitable and fair comparison of knowledge exchange performance among English institutions, a cluster analysis sought to identify groups of universities based on their structural characteristics that shape knowledge-sharing possibilities and challenges. The study also recognized the criticality of diverse higher educational institutions and the difficulties that arise from clustering them. In [25], the study highlights the universities located in countries that host 90% of the top-ranked universities in Latin America by presenting the findings of a descriptive analysis based on clusters of 85 Latin American universities found in the top 50 positions of the ARWU, SIR Scimago, QS, and Webometrics rankings. For the purposes of performing the descriptive statistical analysis, clusters were constructed by taking into account the frequency of the presence of universities in the top 50 of the four rankings, their location, and the country they belong to. In [26], the purpose of the study was to classify Korean universities according to their research performance, and validate the classifications by comparing their research performance to those that are located in the U.S. As compared to U.S. peers, Korean universities' research performance was comparable. Furthermore, the study revealed that the classification outcomes produced by the performance-based method were comparable to those of conventional classifications that used predetermined criteria. However, the above studies are limited only to national or regional data.

Compared to the analyses conducted in studies [17,18,22], our study employed K-Means, GMM, Agglomerative, and Fuzzy C-Means algorithms to offer a more comprehensive and nuanced perspective on the dataset. This approach aimed to unveil diverse patterns and structures that may remain concealed when relying on a single algorithm. To ensure a fair and equitable university clustering process, we expanded upon the six indicators utilized in study [18] by incorporating three additional indicators sourced from the ranking list, as detailed in Section 3. In contrast to the methodologies applied in studies [17,22], which predominantly incorporated research-focused indicators, our approach encompassed a broader spectrum of indicators for evaluating university performance. Despite Fuzzy C-Means calculating the probability of a university belonging to multiple clusters, our algorithm ultimately assigned each university to a single cluster.

3. Dataset and Data Pre-Processing

3.1. Dataset

For the purposes of this research, we acquired a dataset from the official website of Quacquarelli Symonds (QS) for the year 2023. In the dataset, there are over 1400 universities from all over the world, including universities from diverse locations in Europe, Asia, and North America. We selected this particular dataset due to the presence of diverse indicators used for the assessment of university performance, in contrast to other university rankings that primarily rely on bibliographic-related metrics.

In total, there are 27 columns in the dataset, but, according to the QS ranking, each university is ranked and assessed using only the six following columns/indicators:

1. **Academic Reputation** (ar score)—Evaluates the teaching and research quality of the university.
2. **Employer Reputation** (er score)—Evaluates how competent, innovative, and effective students and graduates are for the employment market.
3. **Faculty/student ratio** (fsr score)—Evaluates how universities provide students with meaningful access to faculty staff.
4. **Citations per faculty** (cpf score)—Evaluates the total number of academic citations about the papers published in the last five years.

5. **International student ratio** (isr score)—Evaluates the ability of a university to attract foreign students.
6. **International faculty ratio** (ifr score)—Evaluates the ability of a university to attract foreign faculty staff.

The above indicators each, in turn, get a percentage of 40%, 10%, 20%, 20%, 5%, and 5% of the total score, a proportion specified by QS [2].
In our analysis, we included the following three additional indicators:

1. **Size**—The total number of full-time degree-seeking students.
2. **Focus**—The broad subject areas of each university, e.g., Arts, Humanities, Engineering and Technology, Natural Sciences, etc.
3. **Age Band**—The age of each university.

The selection of the three supplementary indicators was premised on their ability to facilitate the categorization of universities according to their respective values, as shown in Table 1. This enables the establishment of distinct and equitable rankings among the institutions, thus providing a more comprehensive evaluation of their performance across multiple dimensions. Each of the three indicators captures a percentage of the total number of universities. All the above indicators have been selected to be applicable to all universities, regardless of their geographical area.

Table 1. Size, focus, and age band categories' definitions according to QS [2]. Reprinted with permission from Ref. [27].

	Size	Students	Perc. (%)
XL	Extra Large	More than 30,000	23.8
L	Large	≥12,000	46.6
M	Medium	≥5000	23.8
S	Small	Fewer than 5000	5.8
	Focus	Faculty Area	
FC	Full Comprehensive	5 Faculty Areas and Medical School	41.6
CO	Comprehensive	5 Faculty Areas	32.5
FO	Focused	3 or 4 Faculty Areas	22.0
SP	Specialist	2 or Fewer Faculty Areas	3.9
	Classification	Age	
5	Historic	100 Years Old and More	37.5
4	Mature	50–99 Years Old	34.4
3	Established	25–49 Years Old	20.4
2	Young	10–24 Years Old	6.7
1	New	Less than 10 Years Old	0.9

3.2. Data Pre-Processing

Following the description of the indicators used in our analysis, it was important to undertake certain data pre-processing steps as a necessary precursor to the clustering process. As an initial step, the exclusion of universities with missing data in any of the aforementioned nine indicators was essential to ensure equitable evaluation. Subsequently, categorical string values within the "size" and "focus" indicators were mapped into categorical numerical values spanning from 0 to 100. This conversion was conducted in order for the clustering algorithms to function properly, as they receive only numerical values. Lastly, to scrutinize the correlation among the indicators, whether categorical or continuous, we employed the Spearman rank correlation coefficient [28]. The Spearman rank correlation coefficient is a statistical measure that assesses the strength and direction of the monotonic relationship between two variables. It is based on the ranks of the data rather than their actual values. The resulting correlation matrix for the nine indicators is provided in Table 2.

Table 2. Spearman rank correlation matrix for the nine indicators.

	size	focus	age	ar	er	fsr	cpf	ifr	isr
size	1								
focus	0.44	1							
age	0.22	0.21	1						
ar	0.34	0.39	0.33	1					
er	0.18	0.24	0.23	0.79	1				
fsr	−0.22	0.11	0.13	0.32	0.28	1			
cpf	0.11	0.26	0.2	0.51	0.32	0.07	1		
ifr	−0.068	0.12	−0.003	0.45	0.42	0.21	0.45	1	
isr	−0.1	0.05	0.09	0.39	0.33	0.28	0.41	0.69	1

Upon scrutinizing the aforementioned tables, several pertinent observations can be deduced, contributing to the formulation of meaningful conclusions in the context of the present research. The academic and employer reputation indicators have a relatively strong correlation with most of the other indicators and especially with one another, implying that, as the academic reputation of a university increases, employers are more likely to hire students who graduated from that university. Furthermore, a strong correlation is observed in the relationship between the number of international students and the presence of foreign faculty staff. This outcome aligns with expectations, as a university's acceptance of a substantial number of international students logically corresponds with the recruitment of foreign faculty members. Another strong and obvious correlation emerges between a university's academic reputation and the quantity of citations per faculty. This alignment is unsurprising, given that a higher volume of citations stemming from a school's research activities naturally increases the university's overall academic standing. Noteworthy observations can be made regarding the size, focus, and age band indicators. It is apparent that the size of a university influences its focus, and vice versa, but does not significantly impact the age of the university. Therefore, the presence of an extensive array of faculty areas in a university does not necessarily imply an older age but rather suggests a relatively larger student population. Additionally, upon analyzing their correlation with the other continuous indicators, it is clear that the size, age, and broad subject areas do not exert a significant influence on a university's overall performance.

Having established the relative significance of the indicators within our cluster analysis, our subsequent action was to define custom indicator weights, which maintain a proportional ratio to the initial weight assignments provided by QS. Before assessing the clustering algorithms, two distinct normalization techniques were considered:

1. We normalize the data and apply indicator weights.
2. We normalize the data without applying indicator weights.

For normalization, we employed the MinMaxScaler method:

$$x_{\text{scaled}} = \frac{x - x_{\text{min}}}{x_{\text{max}} - x_{\text{min}}}. \quad (1)$$

Each technique was used once per experimentation cycle. One experimentation cycle involves the following steps:

1. Normalizing the data using one of the aforementioned techniques.
2. Clustering the data with different numbers of clusters.
3. Computing the pairwise similarity between all combinations of clustering algorithms using the Rand Index (RI) [29]. The Rand Index measures the similarity between two clustering results by comparing the agreements and disagreements in pairwise cluster assignments.

By calculating the similarity between a pair of clustering algorithms, we gain insights into the degree of proximity between them. However, our objective was to compare the ranking list generated through the amalgamation of clusters produced by a clustering algorithm, with the QS ranking list. Details of how a ranking list is produced from the clustering algorithms are discussed in Section 4. To facilitate this comparison, we created distinct clusters (named QS clusters) to represent the QS ranking list, separate from those produced by the algorithms. The size of these QS clusters corresponded to the size of the clusters generated by the clustering algorithms. Consequently, the members of each QS cluster were organized to match the order of universities as presented in the QS ranking list. For example, if the first cluster (after applying a clustering algorithm) has a size of 100, then the first QS cluster encompasses the first one hundred universities from the QS ranking list. Respectively, the second QS cluster, irrespective of its size, encompasses the consecutive universities following the top one hundred universities from the first cluster. This approach allowed us to essentially compare the QS ranking list, which is represented by the QS clusters, with the rankings produced by the clustering algorithms.

4. Clustering Analysis

The clustering algorithms that were used for this analysis are the following:

1. **K-Means**—K-Means can be a useful algorithm for university clustering when simplicity, efficiency, and intuitive results are important.
2. **GMM**—GMM was selected due to its capability to model the data as coming from a mixture of Gaussian distributions, which is appropriate given the continuous nature of our data. GMM provides a probabilistic model that not only assigns memberships to clusters but also accounts for the covariance structure of the data, thus allowing for a more nuanced understanding of the relationships between universities. GMM was also utilized in a previous study [18], which is relevant to our own research.
3. **Agglomerative**—Agglomerative clustering can be used when a hierarchy of clusters is needed, or when flexibility and interpretability are important. However, it may not be the best choice for all situations, particularly when the underlying data have complex relationships or non-linear distributions.
4. **Fuzzy C-Means**—Fuzzy C-Means was chosen for its ability to allow each university to belong to multiple clusters with varying degrees of membership. This method is particularly useful in capturing the inherent overlaps in university characteristics, which are too complex to be neatly partitioned into crisp clusters.

K-Means and GMM initialized their centroids using the K-Means++ method, which selects initial cluster centroids using sampling based on an empirical probability distribution of the points' contribution to the overall inertia. This technique sped up convergence. The algorithm implemented was "Greedy K-Means++". Fuzzy C-Means initialized the centroids randomly.

To find the optimal number of clusters using the nine indicators we considered the following:

1. The elbow method for a maximum of 30 clusters using the K-Means algorithm to calculate the sum of squared distances from each point to its assigned center.
2. The AIC and BIC for a maximum of 30 clusters. The maximum number of clusters was chosen arbitrarily. Since AIC and BIC are both statistical measures used for model selection and comparison, we used the GMM algorithm for these measures.

By applying the elbow method, the graph in Figure 1 came up. By taking a closer look at the graph, it is apparent that the elbow method does not work well because, as we will see later on, the data are not very clustered. As a result, there is a smooth curve and the optimal value of K is unclear, thus making this method unfit for use.

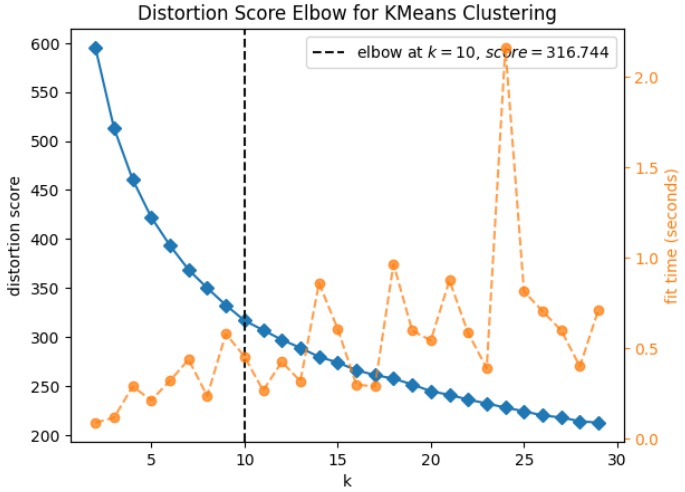

Figure 1. Elbow method for a maximum of 30 clusters using the K-Means algorithm.

Using the AIC and BIC measures we came up with the graph that is shown in Figure 2. The number of clusters for the minimum value of BIC is seven, which is identical to the results of the EM algorithm. The number of clusters for the minimum value of AIC is approximately 29 but we used 24, as the difference between the AIC value of 29 and 24 clusters is quite small. In order to visualize the clusters, we used the Multidimensional Scaling (MDS) algorithm [30] to reduce the initial dimensions of the data to two.

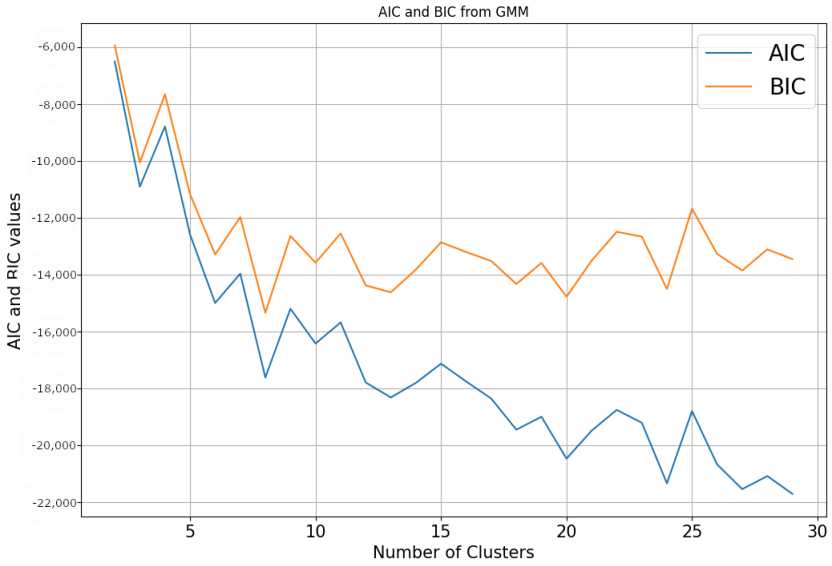

Figure 2. AIC and BIC values for a maximum of 30 clusters and a minimum of two. Reprinted with permission from Ref. [27].

The clusters were ordered according to the mean value of each cluster (CM). The mean value of a cluster was calculated as follows:

$$CM = \frac{\sum_{j=1}^{\text{cluster size}} \frac{\sum_{i=1}^{9} \text{indicator}_{j,i}}{9}}{\text{cluster size}}. \quad (2)$$

We calculated a university's overall performance by summing up its individual indicator values and then dividing the total by nine, the number of indicators, to derive the mean score. Next, by aggregating the means of all universities within a cluster and dividing this sum by the cluster's size, we obtained the cluster's mean score. This methodology generates a cluster ranking that subsequently reflects the ranking of universities within each respective cluster.

4.1. Clustering without Weights for Seven Clusters

The clustering results for seven clusters and nine indicators without weights are shown in Figure 3. The sizes of each cluster for every algorithm are shown in Table 3. Table 4 presents the similarity between every pair of algorithms.

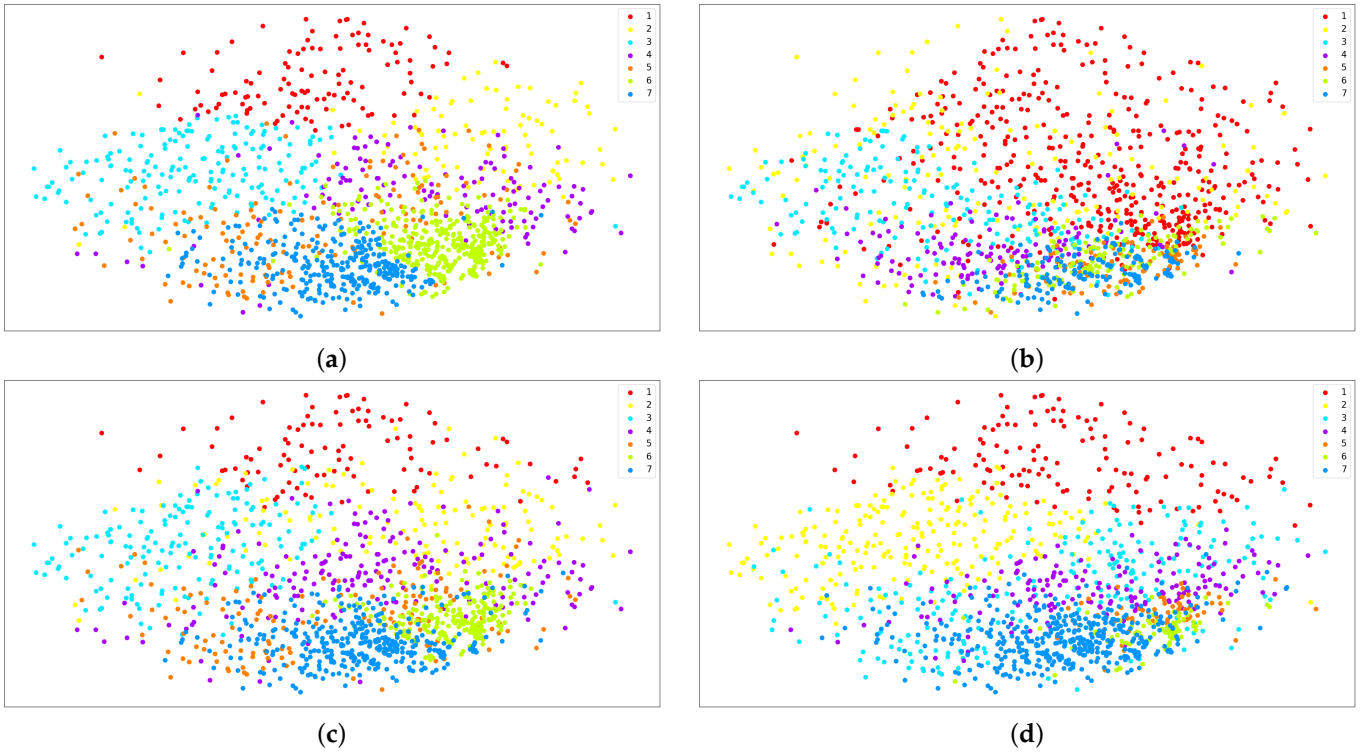

Figure 3. Visualization for seven clusters without weights. (**a**) K-Means, (**b**) GMM, (**c**) Agglomerative, and (**d**) Fuzzy C-Means.

Table 3. Cluster sizes for seven clusters without weights.

	1	**2**	**3**	**4**	**5**	**6**	**7**
KM	112	91	183	126	153	332	311
GMM	441	166	183	130	97	128	163
Agg	99	138	166	183	145	220	357
Fuzzy	138	221	214	161	62	81	431

Table 4. Rand Index for seven clusters without weights.

	KM	GMM	Agg	Fuzzy	QS
KM	1				
GMM	0.729509	1			
Agg	0.86622	0.736062	1		
Fuzzy	0.831163	0.723259	0.819637	1	
QS	0.776705	0.760719	0.78335	0.784693	1

By visualizing the results of the clustering algorithms and calculating the Rand Index (see Table 4), we can make a few observations. First of all, the cluster with the highest mean (the red cluster), for every algorithm, has a very low density. That is to be expected given that universities in that cluster tend to have diverse values for their indicators, whereas

universities in clusters with lower means tend to have similar values for these indicators. Thus, clusters with a lower mean have a higher density.

It is important to note that the clusters exhibit overlap, meaning that universities belonging to one cluster may appear in others. This overlap is a result of two key factors. Firstly, the clustering process relies on nine distinct indicators, while the visualization phase reduces these indicators to just two dimensions. This dimensionality reduction can lead to errors in accurately representing the data. Secondly, the differentiation between the cluster members of a clustering algorithm and the QS clusters contributes to the observed overlap. For the sake of comparison, we assumed that the cluster members of a clustering algorithm mirrored those of the QS clusters (the clusters created to compare the QS ranking list to the ranking list produced by the clustering algorithms). This assumption implies that, regardless of their size, each cluster of a clustering algorithm will encompass the same members (universities) as its corresponding counterpart of the QS clusters. In practice, however, the cluster members of a clustering algorithm often differed from those of the QS clusters. In other words, a university may find itself within a cluster featuring a lower mean, while, according to the clustering of QS, it should have been placed in a cluster with the highest mean, or vice versa. As a result, some universities may appear in different clusters, according to the QS clusters. In order to compare the clusters derived from the clustering methods with those of the QS, we selected the algorithm that demonstrated the highest similarity to the QS, as defined by the Rand Index.

Table 5 illustrates the difference among the cluster members of Fuzzy C-Means and QS, and Figure 4 provides a visual representation corresponding to the findings presented in Table 5. The Cluster Differentiation (CD) row in Table 5 enumerates the difference between the cluster members of Fuzzy C-Means and QS clusters. For example, the first cluster has a CD of 15, implying that there are 15 universities in the first cluster of QS that are not present in the first Fuzzy C-Means cluster. In Figure 4, the university nodes are delineated by two colors. The left color designates the cluster to which a university belongs according to the results of Fuzzy C-Means, while the right color designates the cluster a university is expected to be a part of based on the clustering of QS. The complete/detailed list of clusters for all clustering algorithms can be found in Table A1.

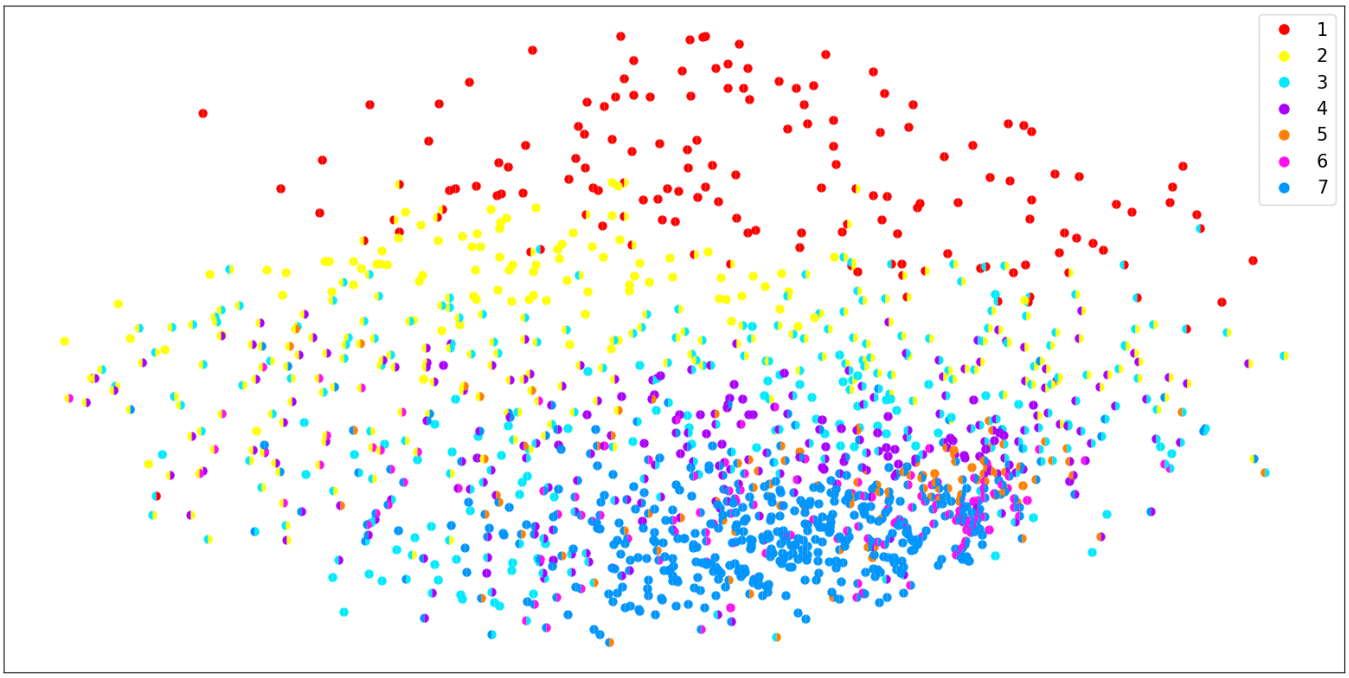

Figure 4. Fuzzy C-Means for seven clusters without weights. The color of the sixth cluster in Figure 3 has been altered from its original light green to pink to enhance visual interpretability.

Table 5. Differentiation between cluster members of Fuzzy C-Means and QS for seven clusters without weights.

Cluster	1	2	3	4	5	6	7
CD	15	130	133	114	56	77	127

In terms of university distribution within the clusters, the K-Means algorithm and the Agglomerative method exhibit considerable similarity. The outcomes of one align closely with the results of the other, and their Rand Index demonstrates a relatively high level of agreement compared to other algorithms. Fuzzy C-Means shares similarities with K-Means and Agglomerative methods, but upon closer examination through the graph and size table, it becomes evident that Clusters 5 and 6 contain significantly fewer universities than their counterparts in the other two methods. Interestingly, the number of universities in the final cluster of Fuzzy C-Means exceeds those in K-Means and Agglomerative by a considerable margin. GMM stands out distinctly from all other algorithms, characterized by an exceptionally large size of the first cluster, and notably, the smallest size of the last cluster in comparison to corresponding clusters in the other algorithms. Furthermore, GMM reveals that a significant number of universities from the higher mean clusters are intermixed with universities from clusters of lower means to a degree not observed in the other clusters.

To assess the significance of each indicator to the clustering process, we employed the following steps:

1. We aggregated the results of K-Means, GMM, Agglomerative, and Fuzzy C-Means to determine the cluster each university belongs to according to the prevailing consensus among the clustering methods. This consensus is determined by identifying the cluster assignment that is most frequently agreed upon by the different clustering algorithms. In other words, we identify the cluster that is most commonly assigned to a university across the various clustering methods.
2. We computed the Spearman correlation coefficient between each indicator and the cluster assignment of universities.

Table 6 shows the strength and nature of the correlation between an indicator and a university's cluster. The nature of the correlation is negative, which indicates a reverse relationship between cluster assignments and indicator values. Some universities have high scores across the nine indicators and are assigned to clusters, such as Cluster 1, characterized by high mean values. Conversely, when universities are assigned to clusters with lower mean values, their individual indicator values tend to decrease. This negative correlation between cluster assignment and indicator values suggests that, as universities are grouped into clusters with lower mean values, such as Cluster 6, their performance, as measured by the indicators, diminishes. Regarding the strength of the correlation, certain indicators, such as focus, academic and employer reputation, citations per faculty, and international faculty and student ratios, showcase a strong correlation with cluster assignments. These indicators likely experience a considerable decrease when universities are assigned to clusters with lower mean values.

Table 6. Correlation of indicators and university cluster assignments for seven clusters without weights.

	Size	Focus	Age	ar	er	fsr	cpf	ifr	isr
Cluster	−0.14	−0.45	−0.2	−0.62	−0.52	−0.37	−0.54	−0.66	−0.57

4.2. Clustering without Weights for 24 Clusters

The clustering results for 24 clusters and nine indicators without weights are shown in Figures 5 and 6. According to Table 7, the Rand Index between every pair of algorithms has significantly increased and the results are now closer to QS. As the number of clusters

increases, there are more possible ways to assign universities to clusters. Consequently, the probability of random agreement between two clustering results also increases. Since the Rand Index considers both the number of agreements and disagreements, it tends to increase with the number of clusters.

Moreover, Table 8 presents the cluster sizes, while Table 9 lists the differentiation between cluster members of Agglomerative and QS clusters for 24 clusters without weights.

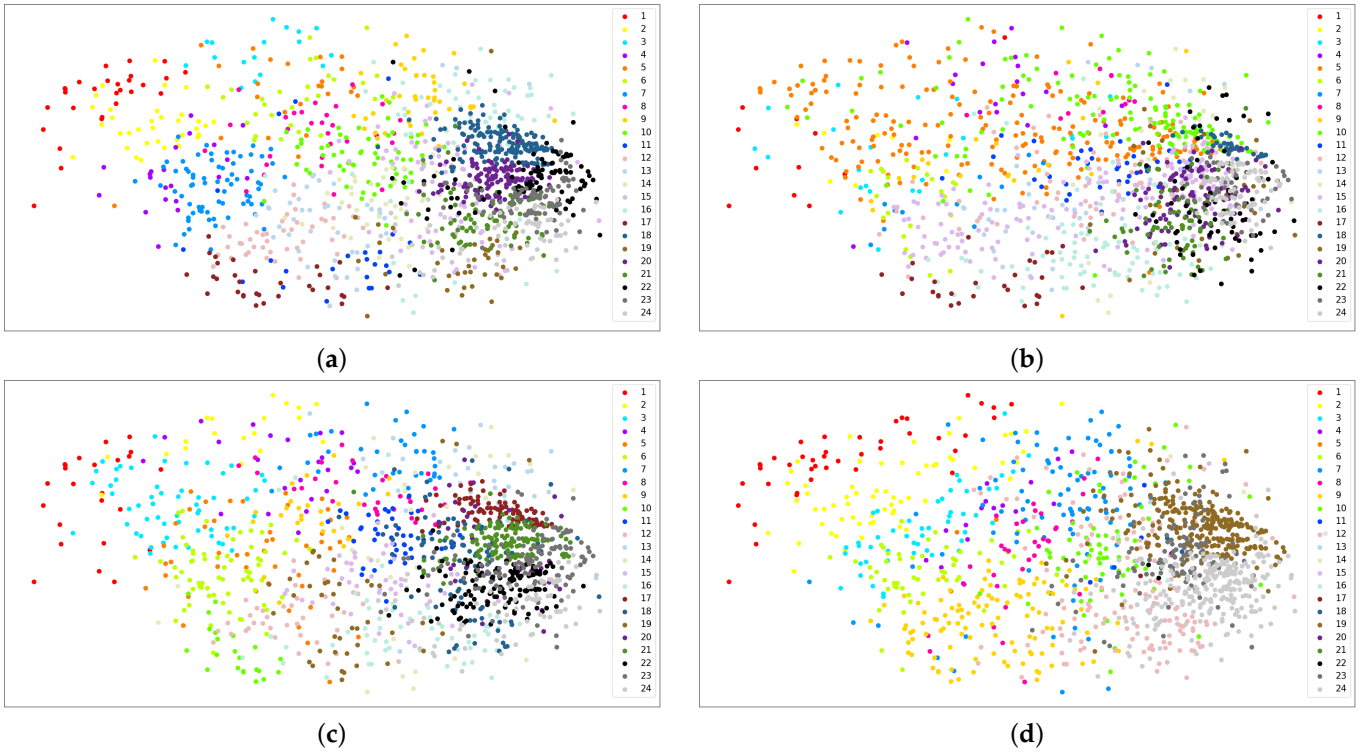

Figure 5. Visualization for 24 clusters without weights. (**a**) K-Means, (**b**) GMM, (**c**) Agglomerative, and (**d**) Fuzzy C-Means.

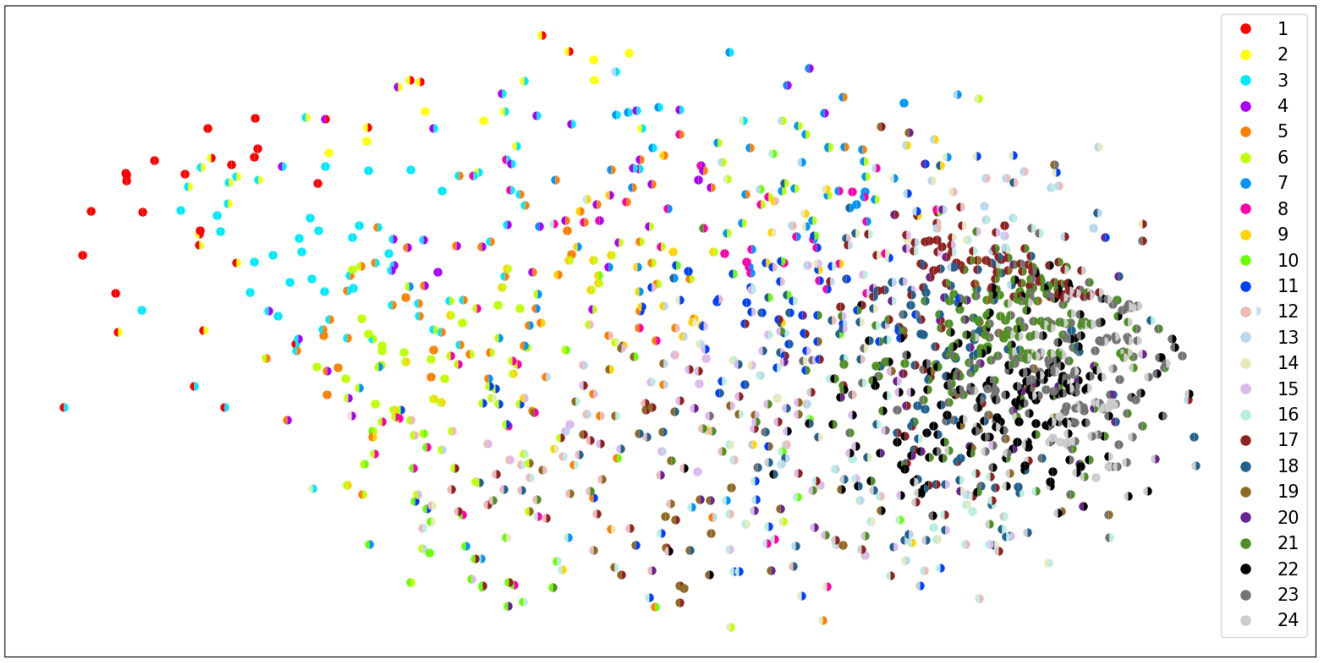

Figure 6. Agglomerative for 24 clusters without weights.

Table 7. Rand Index for 24 clusters without weights.

	KM	GMM	Agg	Fuzzy	QS
KM	1				
GMM	0.895197	1			
Agg	0.939602	0.897548	1		
Fuzzy	0.898327	0.848678	0.885155	1	
QS	0.90274	0.872009	0.90325	0.832328	1

Table 8. Cluster sizes for 24 clusters without weights.

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
KM	28	34	17	21	24	29	70	30	41	62	24	47
	13	14	15	16	17	18	19	20	21	22	23	24
	42	37	79	60	31	154	37	111	70	100	91	69
GMM	11	8	23	19	196	22	11	11	20	132	37	59
	13	14	15	16	17	18	19	20	21	22	23	24
	33	24	165	80	28	42	28	91	73	69	49	77
Agg	24	19	56	24	48	65	36	30	27	22	44	37
	13	14	15	16	17	18	19	20	21	22	23	24
	33	32	47	57	95	88	42	31	125	120	132	74
Fuzzy	42	62	49	16	3	55	92	34	109	67	4	130
	13	14	15	16	17	18	19	20	21	22	23	24
	1	3	2	2	1	2	258	1	1	2	121	251

Table 9. Differentiation between cluster members of Agglomerative and QS clusters for 24 clusters without weights.

Cluster	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CD	8	12	33	22	40	49	33	26	26	21	41	37
	13	14	15	16	17	18	19	20	21	22	23	24
	31	30	43	54	84	75	37	31	106	97	100	65

4.3. Clustering with Weights for Seven Clusters

The clustering results for seven clusters and nine indicators multiplied with weights are shown in Figure 7. The academic reputation indicator carries the highest weight as it exerts the most substantial correlation on the other indicators. In the university categorization process, the size, age, and focus indicators have each been assigned a weight of 0.1. This assignment reflects the fact that these indicators were not considered by the QS in their university rankings. The initial weight values for the faculty-to-student ratio (fsr) and citations per faculty (cpf) indicators were set at half the weight of the academic reputation indicator. By assigning a weight of 0.125, we have maintained this initial proportion. To avoid bias against universities that may not admit or have the legal capacity to accept foreign students or faculty, the international student and faculty ratio indicators were assigned smaller weight values.

The Rand Index (Table 10) between the weighted clustering, utilizing nine indicators multiplied by weights, and the unweighted clustering shows a relatively modest change. Specifically, we observe a slight increase in the similarity between the Fuzzy C-Means algorithm and Agglomerative, which results in an improvement in the similarity between Agglomerative and QS. K-Means exhibits a higher similarity with QS.

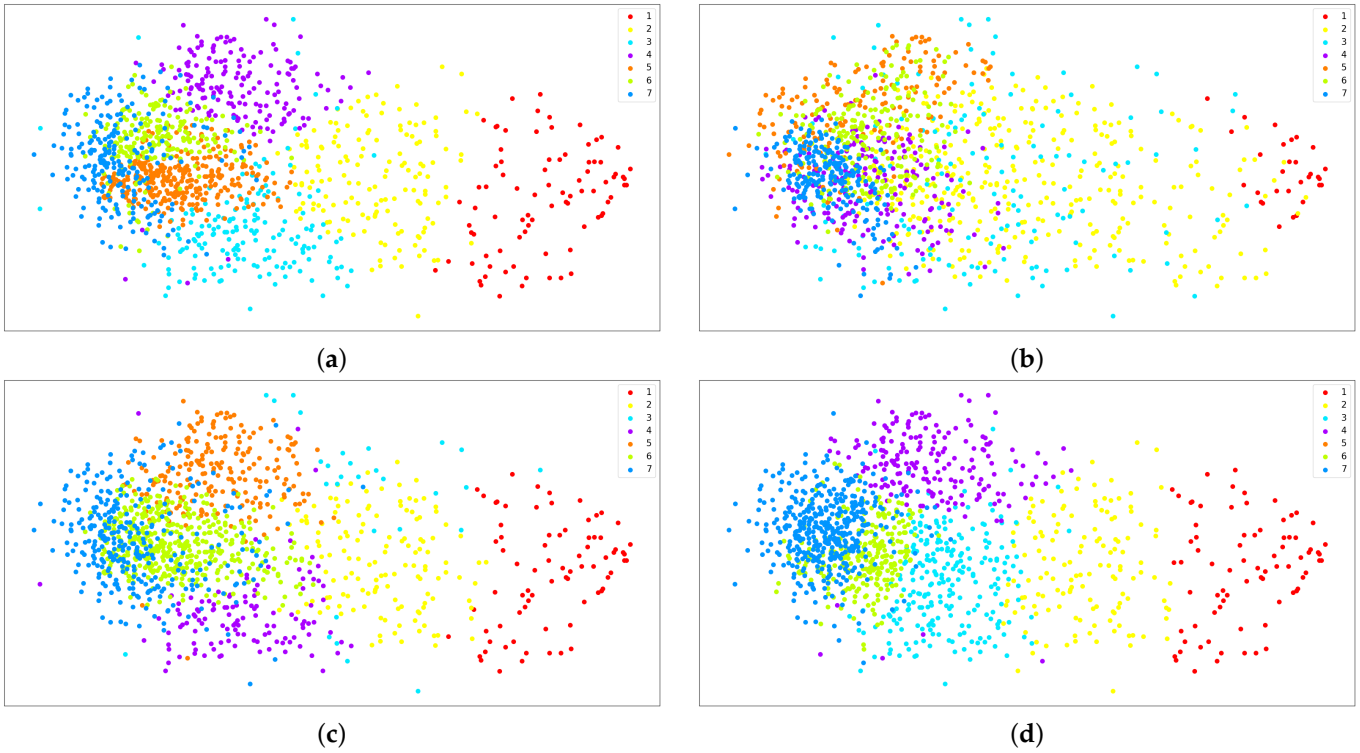

Figure 7. Visualization for seven clusters and nine indicators multiplied with weights. (**a**) K-Means, (**b**) GMM, (**c**) Agglomerative, and (**d**) Fuzzy C-Means.

Table 10. Rand Index for seven clusters with weights [27].

	KM	GMM	Agg	Fuzzy	QS
KM	1				
GMM	0.75669	1			
Agg	0.843652	0.721143	1		
Fuzzy	0.823669	0.733421	0.774022	1	
QS	0.783811	0.769252	0.739359	0.7783	1

In terms of the configuration and size of the clusters (Table 11), the graphs reveal that clusters generated by the K-Means, Agglomerative, and Fuzzy C-Means algorithms are more distinctly separated in the weighted approach, making it easier to discern the distribution of universities. However, this improvement does not extend to the GMM algorithm, in which clusters remain mixed. The differentiation between cluster members of K-Means and QS clusters for seven clusters with weights is presented in Table 12 and visualized in Figure 8. The indicators and their corresponding weights are shown in Table 13.

Table 11. Cluster sizes for seven clusters with weights.

	1	**2**	**3**	**4**	**5**	**6**	**7**
KM	85	152	162	166	312	202	229
GMM	30	350	136	189	162	219	222
Agg	77	138	29	117	211	422	314
Fuzzy	78	138	236	193	1	242	420

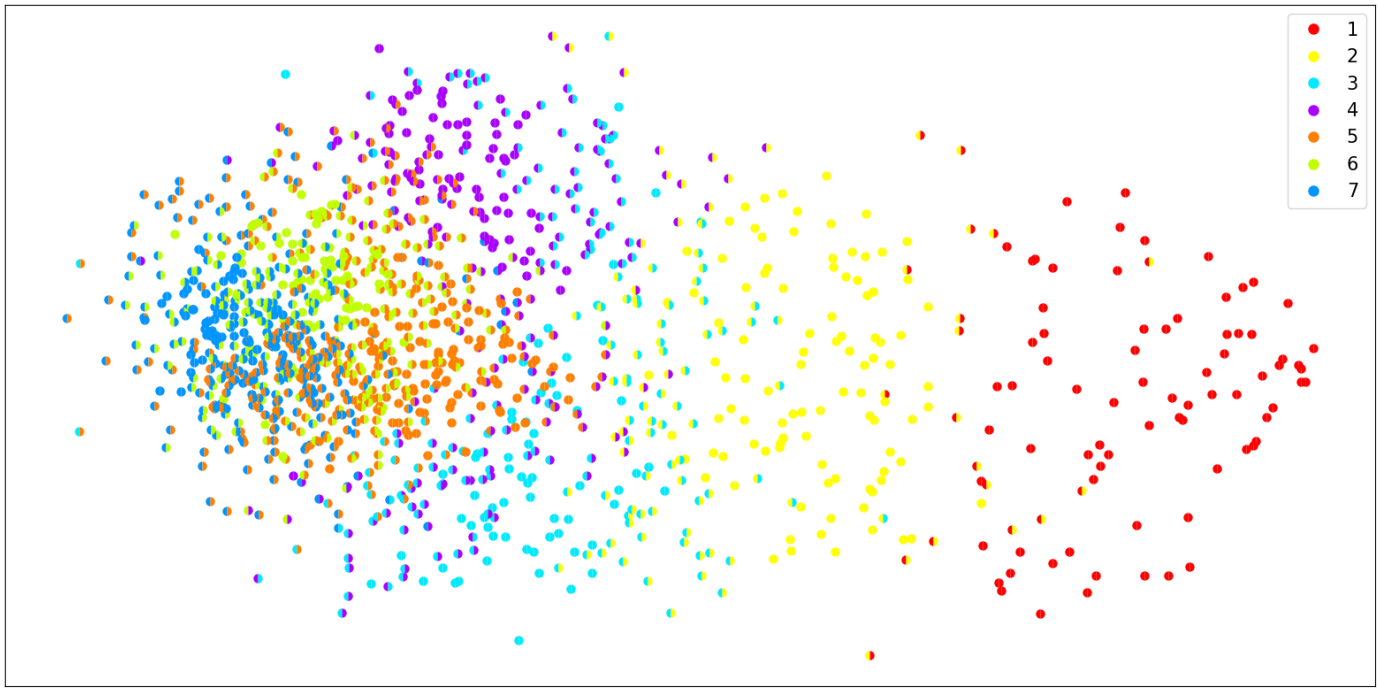

Figure 8. K-Means for seven clusters with weights.

Table 12. Differentiation between cluster members of K-Means and QS clusters for seven clusters with weights.

Cluster	1	2	3	4	5	6	7
CD	9	53	98	107	216	144	171

Table 13. Weights for the nine indicators. Reprinted with permission from Ref. [27].

Size	Age	Focus	ar	er	fsr	cpf	ifr	isr
0.1	0.1	0.1	0.25	0.1	0.125	0.125	0.05	0.05

Table 14 shows the correlation of the indicators with the cluster assignments using the weights specified in Table 13. The correlations of the size and age indicators have notably increased compared to their correlations in Table 6, when weights were not considered. Additionally, the correlations of the academic reputation, employer reputation, and faculty/student ratio indicators have shown an increase. This suggests that, as the cluster assignment increases, the indicator values now decrease to a greater extent than before, when weights were not applied. However, the correlation of the citations per faculty indicator remains unchanged, while the correlation of the international faculty and student ratio indicators has decreased in relation to the cluster assignment.

Table 14. Correlation of indicators and university cluster assignments for seven clusters with weights.

	Size	Focus	Age	ar	er	fsr	cpf	ifr	isr
Cluster	−0.27	−0.45	−0.45	−0.75	−0.59	−0.44	−0.54	−0.34	−0.35

4.4. Clustering with Weights for 24 Clusters

In the case of clustering with 24 clusters in Figure 9, there are no noteworthy observations regarding the K-Means and Agglomerative methods. In the case of Fuzzy C-Means, it is notable that results are provided for only 20 clusters (Table 15). This is due to the presence of four clusters with zero universities. This is not surprising, given that there are

already two clusters that have only one university. The specific identity of these clusters with zero universities does not carry particular significance, as universities are generally assigned to a cluster before the calculation of cluster means. The calculation of the mean value of each cluster is the key determinant of a cluster's significance, and, in this context, clusters with zero universities are excluded from that process.

The differentiation between cluster members of K-Means and QS clusters for 24 clusters with weights is presented in Table 16 and visualized in Figure 10. Finally, according to Table 17, K-Means demonstrates a higher similarity with QS for 24 clusters with weights.

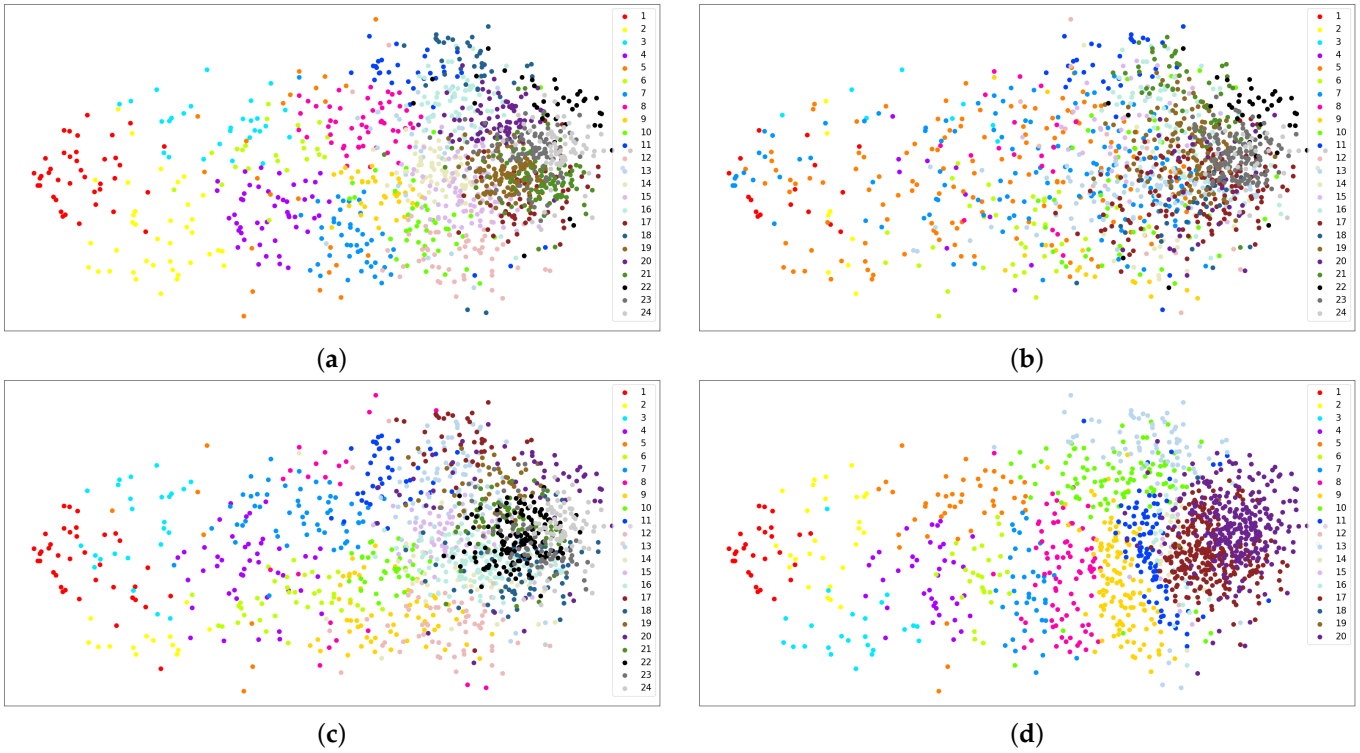

Figure 9. Visualization for 24 clusters with weights. (**a**) K-Means, (**b**) GMM, (**c**) Agglomerative, and (**d**) Fuzzy C-Means.

Table 15. Cluster sizes for 24 clusters with weights.

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
KM	40	38	28	48	23	23	44	53	35	41	33	56
	13	14	15	16	17	18	19	20	21	22	23	24
	34	68	80	59	53	38	133	81	96	38	94	72
GMM	17	8	8	10	140	34	136	19	18	43	31	16
	13	14	15	16	17	18	19	20	21	22	23	24
	101	25	39	70	147	27	114	35	60	40	143	27
Agg	38	14	25	44	7	38	56	22	57	35	42	60
	13	14	15	16	17	18	19	20	21	22	23	24
	82	39	58	131	39	64	48	56	60	138	68	87
Fuzzy	28	27	24	39	43	27	38	82	121	98	92	1
	13	14	15	16	17	18	19	20	21	22	23	24
	76	15	12	23	262	1	2	297	0	0	0	0

Table 16. Differentiation between cluster members of K-Means and QS clusters for 24 clusters with weights.

Cluster	1	2	3	4	5	6	7	8	9	10	11	12
CD	4	18	21	30	19	22	32	38	31	33	28	45
	13	14	15	16	17	18	19	20	21	22	23	24
	31	64	66	51	47	37	119	72	69	38	67	63

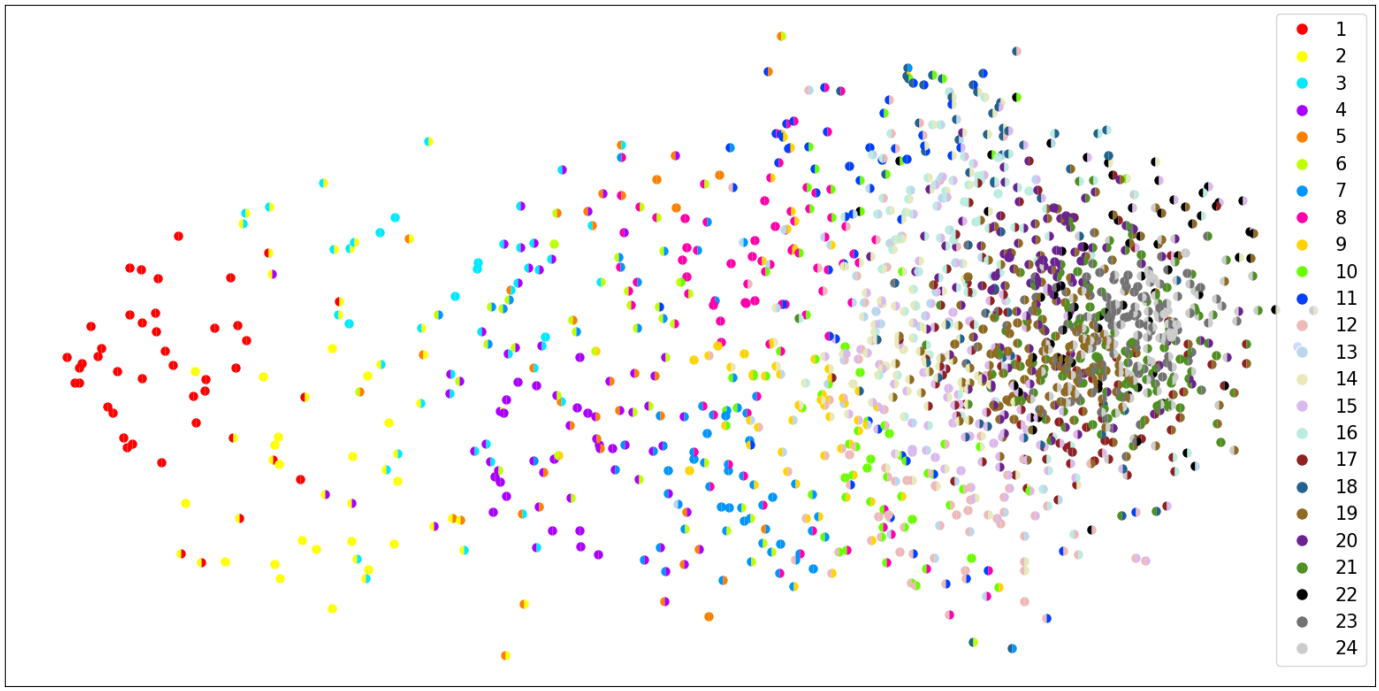

Figure 10. K-Means for 24 clusters with weights.

Table 17. Rand Index for 24 clusters with weights.

	KM	GMM	Agg	Fuzzy	QS
KM	1				
GMM	0.904505	1			
Agg	0.938935	0.907833	1		
Fuzzy	0.879995	0.847311	0.873114	1	
QS	0.916053	0.882512	0.908657	0.845611	1

4.5. Discussion

Among the methods tested, Fuzzy C-Means emerged as the most promising method for seven clusters without weights, exhibiting the highest Rand Index (RI). We decided to opt for seven clusters over 24 clusters due to interpretability considerations, as fewer clusters are easier to interpret. Additionally, clustering methods with weights were not chosen as promising methods due to their arbitrary nature. Although the QS ranking system has established predetermined weights for its indicators, there are numerous ways to adjust these weights while maintaining their original ratio. This highlights the importance of selecting appropriate clustering methods and cluster numbers based on both performance metrics and interpretability requirements.

This study's primary insight lies in revealing the positioning of universities into clusters, as explicitly outlined in Table A1. Interestingly, despite being expected to reside within the same cluster according to the QS ranking, some universities are instead placed in a distant cluster, characterized by a significantly different cluster mean. This understanding

underscores that these universities exhibit greater similarity to the universities within their current cluster than to those they were expected to be grouped with according to the QS ranking. This information can aid universities in assessing their performance by offering a different perspective on their rankings.

While the current study has provided valuable insights into clustering universities, it is important to acknowledge its limitations. A significant limitation lies in the use of only nine indicators. With a broader range of indicators, we could obtain more accurate and comprehensive data results. Another limitation arises from the time-dependent nature of university rankings. QS publishes university rankings annually, potentially assigning different ranks to individual universities, and different weights to the indicators each year. Consequently, the clustering process must be conducted every year. Finally, a limitation is related to the visualization of the data and, more precisely, the case where different universities seem to overlap across different clusters. This is because of the transition from nine to two dimensions.

5. Conclusions

Rankings offer a clear and straightforward way to compare universities, while clustering provides a more nuanced understanding of the diversity and similarities within the higher education landscape. Instead of a strict numerical ranking, clustering provides a more comprehensive view by highlighting similarities and differences between groups of universities, allowing for better comparisons and assessments. Clustering analysis introduces a dynamic aspect to rankings, highlighting that institutions can move between clusters based on their performance over time. Moreover, grouping universities may impact their reputation positively or negatively, depending on the cluster they belong to. Institutions in higher-ranked clusters may experience an improvement in their global reputation, attracting more students, faculty, and research collaborations.

In this article, we conducted a thorough analysis of university ranking data and concluded that clustering methods can be applied to group institutions with similar characteristics and provide a ranking between different groups. The latter is achieved by ordering clusters based on the performance of institutions within them. When examining the distribution of institutions within each cluster, discernible differences emerged among clusters generated through different algorithms, varied cluster numbers, or the inclusion of adjusted weights, as opposed to those formed without incorporating weights. Moreover, a comprehensive analysis of the features utilized in the clustering analysis revealed the degree of correlation and importance of each feature in assessing an institution's performance. Overall, creating a hierarchical ranking that ranks universities from best to worst or relying on a narrow set of indicators to assess an institution's performance may restrict the richness of results. Alternatively, leveraging clustering methods allows us to overcome these limitations and achieve a more nuanced understanding.

Table A1 illustrates the distribution of universities across clusters based on their profile similarities. It demonstrates that our method groups institutions not by their ordinal rankings, but by their shared attributes and challenges, enhancing the comprehension of what constitutes institutional excellence beyond mere numerical ranking. The consistency in cluster membership, as shown in Table A1, provides empirical evidence that our clustering approach enables a deeper and more stable understanding of universities' characteristics, aligning with our goal of facilitating peer learning among similarly profiled institutions.

Opportunities for future research abound in refining and expanding upon the current study's findings. One avenue for exploration involves further refinement of distance functions used in assessing university similarity or proximity, with a focus on tailoring these functions to better capture nuances in university performance. Moreover, future research could delve into the exploration of additional indicators and weights influencing university clustering, such as geographical location, academic disciplines, or institutional characteristics. To enrich the clustering process, we might consider incorporating supplementary indicators from alternative sources or organizations. By integrating these elements into

the clustering framework, researchers can gain deeper insights into the complex dynamics of university groupings and their implications for various stakeholders in the higher education landscape. A more comprehensive analysis could extend beyond our clustering process to delve into the question of which indicators and their corresponding values lead certain universities to be grouped into clusters with means different from those anticipated based on QS rankings. Moving forward, we intend to consider the implications of the Variance Inflation Factor (VIF) more thoroughly in future work, exploring methods to integrate this important aspect of data pre-processing. This will enable us to refine our model further and enhance the interpretability and validity of our findings.

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Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A

Table A1. The table presents the universities grouped by cluster for each clustering algorithm alongside their corresponding QS cluster without using weights. Within the table, the QS columns represent the cluster assignment based on the QS clustering method, while the remaining columns denote the cluster assignments according to the Fuzzy C-Means, K-Means, GMM, and Agglomerative clustering methods.

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
Massachusetts Institute of Technology (MIT)	1	1	1	1	1	1	2	1	1
University of Cambridge	2	1	1	1	1	1	1	1	1
Stanford University	3	1	1	1	1	1	1	1	1
University of Oxford	4	1	1	1	1	1	1	1	1
Harvard University	5	1	1	1	1	1	1	1	1
California Institute of Technology (Caltech)	6=	1	1	1	1	1	2	1	1
Imperial College London	6=	1	1	1	1	1	1	1	1
UCL	8	1	1	1	1	1	1	1	1
ETH Zurich—Swiss Federal Institute of Technology	9	1	1	1	1	1	2	1	1
University of Chicago	10	1	1	1	1	1	1	1	1
National University of Singapore (NUS)	11	1	1	1	1	1	1	1	1
Peking University	12	1	1	1	1	1	1	1	1
University of Pennsylvania	13	1	1	1	1	1	1	1	1
Tsinghua University	14	1	1	1	2	1	1	1	1
The University of Edinburgh	15	1	1	1	1	1	1	1	1
EPFL	16=	1	1	1	1	1	2	1	1
Princeton University	16=	1	1	1	1	1	2	1	1
Yale University	18	1	1	1	1	1	1	1	1
"Nanyang Technological University, Singapore (NTU)"	19	1	1	1	1	1	1	1	1
Cornell University	20	1	1	1	1	1	1	1	1
The University of Hong Kong	21	1	1	1	1	1	1	1	1
Columbia University	22	1	1	1	1	1	1	1	2
The University of Tokyo	23	1	1	1	2	1	1	1	1
Johns Hopkins University	24	1	1	1	1	1	1	1	1
University of Michigan-Ann Arbor	25	1	1	1	2	1	1	1	1
Université PSL	26	1	1	1	1	1	2	1	1
"University of California, Berkeley (UCB)"	27	1	1	1	1	1	1	1	1

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
The University of Manchester	28	1	1	1	1	1	1	1	1
Seoul National University	29	1	1	1	2	1	1	1	1
The Australian National University	30	1	1	1	1	1	1	1	1
McGill University	31	1	1	1	1	1	1	1	1
Northwestern University	32	1	1	1	2	1	1	1	1
The University of Melbourne	33	1	1	1	1	1	1	1	1
Fudan University	34=	1	1	1	1	1	1	1	1
University of Toronto	34=	1	1	1	1	1	1	1	1
Kyoto University	36	1	1	1	2	1	1	1	1
King's College London	37	1	1	1	1	1	1	1	1
The Chinese University of Hong Kong (CUHK)	38	1	1	1	1	1	1	1	1
New York University (NYU)	39	1	1	1	2	1	1	1	2
The Hong Kong University of Science and Technology	40	1	1	1	1	1	2	1	1
The University of Sydney	41	1	1	1	1	1	1	1	1
KAIST—Korea Advanced Institute of Science & Technology	42=	1	1	1	2	1	2	1	1
Zhejiang University	42=	1	1	1	1	1	1	1	1
"University of California, Los Angeles (UCLA)"	44	1	1	1	2	1	1	1	1
The University of New South Wales (UNSW Sydney)	45	1	1	1	1	1	1	1	1
Shanghai Jiao Tong University	46	1	1	1	2	1	1	1	1
University of British Columbia	47	1	1	1	1	1	1	1	1
Institut Polytechnique de Paris	48	1	1	1	1	1	2	1	1
Technical University of Munich	49	1	1	1	1	1	2	1	2
Duke University	50=	1	1	1	2	1	1	1	2
The University of Queensland	50=	1	1	1	1	1	1	1	1
Carnegie Mellon University	52	1	1	1	1	1	1	1	1
"University of California, San Diego (UCSD)"	53	1	1	1	1	1	1	1	1
City University of Hong Kong	54	1	1	1	1	1	2	1	1
Tokyo Institute of Technology (Tokyo Tech)	55	1	1	1	2	1	2	1	1
The London School of Economics and Political Science (LSE)	56	1	1	1	1	1	2	1	1
Monash University	57	1	1	1	1	1	1	1	1
University of Amsterdam	58	1	1	1	1	1	1	1	1
Ludwig-Maximilians-Universität München	59	1	1	1	2	1	1	1	2
Sorbonne University	60	1	1	1	2	1	1	1	4
Delft University of Technology	61=	1	1	1	1	1	2	1	1
University of Bristol	61=	1	1	1	1	1	1	1	1
Brown University	63	1	1	1	1	1	1	1	2
The University of Warwick	64	1	1	1	1	1	1	1	1
Ruprecht-Karls-Universität Heidelberg	65=	1	1	1	2	1	1	1	2
The Hong Kong Polytechnic University	65=	1	1	1	1	1	2	1	1
Universidad de Buenos Aires (UBA)	67	1	1	1	2	1	1	1	2
Osaka University	68	1	1	1	2	1	1	1	1
Université Paris-Saclay	69	1	1	1	2	1	2	1	1
Universiti Malaya (UM)	70	1	1	1	2	1	1	1	2
Pohang University of Science And Technology (POSTECH)	71	1	3	1	2	1	2	1	4
University of Texas at Austin	72	1	1	1	2	1	1	1	2
Yonsei University	73	1	1	1	2	1	1	1	2
Korea University	74	1	1	1	2	1	1	1	2
Lomonosov Moscow State University	75	1	1	1	2	1	1	1	2
KU Leuven	76	1	1	1	1	1	1	1	1
National Taiwan University (NTU)	77	1	1	1	2	1	1	1	2
University of Southampton	78	1	1	1	1	1	1	1	1
Tohoku University	79	1	3	1	2	1	1	1	2
University of Washington	80	1	1	1	2	1	1	1	2
University of Glasgow	81	1	1	1	1	1	1	1	1
University of Copenhagen	82	1	1	1	2	1	1	1	2
University of Wisconsin-Madison	83=	1	1	1	2	1	1	1	2
University of Zurich	83=	1	1	1	1	1	1	1	2
University of Illinois at Urbana-Champaign	85	1	1	1	2	1	1	1	2
University of Leeds	86	1	1	1	1	1	1	1	1
The University of Auckland	87	1	1	1	1	1	1	1	1
Georgia Institute of Technology	88	1	1	1	1	1	2	1	1
KTH Royal Institute of Technology	89	1	1	1	1	1	2	1	2
The University of Western Australia	90	1	1	1	1	1	1	1	1
University of Birmingham	91	1	1	1	1	1	1	1	1
Durham University	92	1	1	1	1	1	1	1	1
Pennsylvania State University	93	1	1	1	2	1	1	1	2
University of Science and Technology of China	94	1	3	1	4	1	2	1	4

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
Lund University	95	1	1	1	1	1	1	1	1
The University of Sheffield	96=	1	1	1	1	1	1	1	1
University of St Andrews	96=	1	1	1	1	1	1	1	1
"Trinity College Dublin, The University of Dublin"	98	1	1	1	1	1	1	1	1
Sungkyunkwan University (SKKU)	99	1	3	1	2	1	1	1	2
Rice University	100	1	1	1	1	1	1	2	1
University of Oslo	101	1	1	1	1	1	1	2	2
"University of California, Davis"	102=	1	1	1	1	1	1	2	1
"University of North Carolina, Chapel Hill"	102=	1	3	1	2	1	1	2	2
Technical University of Denmark	104=	1	1	1	1	1	2	2	2
Universidad Nacional Autónoma de México (UNAM)	104=	1	3	1	2	1	1	2	2
King Abdulaziz University (KAU)	106=	1	1	1	1	1	1	2	2
University of Helsinki	106=	1	1	1	2	1	2	2	2
Boston University	108	1	1	1	1	1	1	2	1
The University of Adelaide	109	1	1	1	1	1	1	2	1
University of Alberta	110	1	1	1	1	1	1	2	1
École Normale Supérieure de Lyon	111	1	1	1	4	1	2	2	4
Nagoya University	112=	1	3	1	2	1	1	2	2
Utrecht University	112=	1	1	2	4	1	1	2	4
University of Nottingham	114	1	1	2	1	1	1	2	1
Universidade de São Paulo	115	1	3	2	2	1	1	2	2
Aalto University	116=	1	2	2	1	1	2	2	3
Université de Montréal	116=	1	1	2	1	1	1	2	2
Freie Universitaet Berlin	118=	1	1	2	2	1	1	2	2
Washington University in St. Louis	118=	1	1	2	1	1	1	2	2
University of Bern	120	1	2	2	1	1	2	2	2
Pontificia Universidad Católica de Chile (UC)	121	1	1	2	2	1	1	2	2
Newcastle University	122	1	1	2	1	1	1	2	1
Universiti Putra Malaysia (UPM)	123	1	1	2	2	1	1	2	2
Wageningen University & Research	124	1	3	2	5	1	2	2	2
Chalmers University of Technology	125=	1	1	2	1	1	2	2	2
Queen Mary University of London	125=	1	1	2	1	1	1	2	1
University of Geneva	125=	1	1	2	1	1	1	2	1
Uppsala University	128	1	1	2	1	1	1	2	1
Purdue University	129=	1	1	2	2	1	1	2	2
Universiti Kebangsaan Malaysia (UKM)	129=	1	3	2	2	1	1	2	2
Humboldt-Universität zu Berlin	131=	1	1	2	2	1	1	2	2
Leiden University	131=	1	1	2	1	1	1	2	1
Nanjing University	133	1	1	2	4	1	1	2	4
University of Southern California	134	1	1	2	1	1	1	2	1
Kyushu University	135	1	3	2	2	1	1	2	2
University of Basel	136	1	1	2	1	1	1	2	1
University of Technology Sydney	137	1	2	2	1	1	2	2	3
Eindhoven University of Technology	138	1	2	2	1	1	2	2	2
Politecnico di Milano	139	2	1	2	2	1	2	2	1
The Ohio State University	140	2	1	2	2	1	1	2	2
Hokkaido University	141=	2	3	2	2	1	1	2	2
"KIT, Karlsruhe Institute of Technology"	141=	2	1	2	1	1	2	2	1
Ghent University	143=	2	1	2	2	1	1	2	2
Universiti Sains Malaysia (USM)	143=	2	3	2	2	1	1	2	2
University of Groningen	145	2	1	2	1	1	1	2	1
Lancaster University	146	2	2	2	1	1	1	2	1
RWTH Aachen University	147=	2	1	2	1	1	1	2	1
University of Rochester	147=	2	1	2	1	1	1	2	2
"University of California, Santa Barbara (UCSB)"	149	2	2	2	4	1	2	2	4
Al-Farabi Kazakh National University	150	2	3	2	2	1	1	2	2
University of Vienna	151	2	1	2	1	1	1	2	1
McMaster University	152	2	1	2	1	1	1	2	2
Stockholm University	153	2	2	2	3	1	2	2	1
University of Waterloo	154	2	2	2	1	1	2	2	3
Emory University	155=	2	3	2	5	1	1	2	2
Indian Institute of Science	155=	2	3	2	4	1	2	2	4
Hanyang University	157	2	3	2	2	1	1	2	2
Technische Universität Berlin (TU Berlin)	158	2	1	2	2	1	2	2	2
Michigan State University	159	2	1	2	2	1	1	2	2
King Fahd University of Petroleum & Minerals	160	2	1	2	3	1	1	2	2

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
Aarhus University	161	2	2	2	4	1	1	2	4
University of York	162	2	2	2	1	1	1	2	1
The University of Exeter	163	2	2	2	1	1	1	2	1
Texas A&M University	164=	2	4	2	2	1	1	2	2
"University of Maryland, College Park"	164=	2	3	2	4	1	1	2	2
Cardiff University	166	2	1	2	1	1	1	2	1
Alma Mater Studiorum—University of Bologna	167=	2	4	2	2	1	1	2	2
Universidad de Chile	167=	2	3	2	2	1	1	2	2
Eberhard Karls Universität Tübingen	169	2	3	2	5	1	1	2	2
Tecnológico de Monterrey	170	2	1	2	2	1	1	2	2
Sapienza University of Rome	171	2	4	2	2	1	1	2	2
Indian Institute of Technology Bombay (IITB)	172=	2	3	2	2	1	2	2	2
Western University	172=	2	2	2	1	1	1	2	3
Ecole des Ponts ParisTech	174=	2	3	2	5	1	2	2	2
Indian Institute of Technology Delhi (IITD)	174=	2	3	2	2	1	2	2	2
Case Western Reserve University	176	2	3	2	5	1	1	2	2
National Tsing Hua University	177	2	3	2	2	1	2	2	2
Universitat Autònoma de Barcelona	178	2	4	2	4	1	1	2	2
Technische Universität Wien	179=	2	2	2	1	1	2	2	3
University of Bath	179=	2	2	2	1	1	2	2	1
Khalifa University of Science and Technology	181=	2	2	2	3	1	2	2	3
University College Dublin	181=	2	2	2	1	1	1	2	1
University of Pittsburgh	181=	2	3	2	5	1	1	2	5
Universitat de Barcelona	184	2	4	2	2	1	1	2	2
University of Gothenburg	185=	2	2	2	3	1	1	2	2
University of Minnesota Twin Cities	185=	2	3	2	2	1	1	2	2
University of Wollongong	185=	2	2	2	3	1	1	2	3
University of Florida	188	2	3	2	2	1	1	2	2
Albert-Ludwigs-Universitaet Freiburg	189	2	2	2	4	1	1	2	4
RMIT University	190=	2	2	2	1	1	2	2	3
University of Liverpool	190=	2	2	2	1	1	1	2	1
"The University of Newcastle, Australia (UON)"	192	2	2	2	4	1	1	2	4
Curtin University	193	2	2	2	3	1	2	2	3
Wuhan University	194	2	2	2	4	1	1	2	4
Macquarie University	195=	2	2	2	1	1	1	2	3
Université catholique de Louvain (UCLouvain)	195=	2	2	2	1	1	1	2	4
Keio University	197=	2	3	2	2	1	1	2	2
Ulsan National Institute of Science and Technology (UNIST)	197=	2	3	2	4	1	2	2	4
Vanderbilt University	199	2	3	2	5	1	1	2	2
Technische Universität Dresden	200	2	3	2	2	1	1	2	2
Rheinische Friedrich-Wilhelms-Universität Bonn	201	2	3	2	5	1	1	2	2
National Yang Ming Chiao Tung University	202	2	3	2	2	1	1	2	4
Universiti Teknologi Malaysia	203=	2	3	2	2	1	2	2	2
University of Lausanne	203=	2	2	3	3	1	2	2	3
Dartmouth College	205=	2	3	3	4	1	1	2	4
Waseda University	205=	2	3	3	2	1	2	2	2
University of Bergen	207	2	2	3	5	1	1	2	2
Erasmus University Rotterdam	208=	2	2	3	1	1	2	2	3
Qatar University	208=	2	2	3	3	1	1	2	3
Universidade Estadual de Campinas (Unicamp)	210=	2	4	3	4	1	1	2	2
Universite libre de Bruxelles	210=	2	2	3	1	1	1	2	3
Tongji University	212=	2	2	3	4	1	1	2	4
University of Twente	212=	2	2	3	3	1	2	2	3
Vrije Universiteit Amsterdam	214	2	2	3	4	1	1	2	4
Universidad Autónoma de Madrid	215=	2	3	3	2	1	1	2	2
University of Göttingen	215=	2	3	3	5	1	1	2	2
Harbin Institute of Technology	217=	2	3	3	4	1	2	2	4
University of Otago	217=	2	2	3	3	1	1	2	4
Arizona State University	219	2	2	3	4	1	2	2	4
Universidad de los Andes	220=	2	3	3	2	1	1	2	2
University of Aberdeen	220=	2	2	3	1	1	1	2	3
Queensland University of Technology (QUT)	222=	2	2	3	3	1	2	2	3
The Hebrew University of Jerusalem	222=	2	3	3	5	1	1	2	2
Chulalongkorn University	224=	2	3	3	2	1	1	2	2
National Cheng Kung University (NCKU)	224=	2	3	3	2	1	1	2	2
Complutense University of Madrid	226=	2	3	3	2	1	1	2	2
Southern University of Science and Technology	226=	2	3	3	5	1	2	2	4

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
Universität Hamburg	228	2	3	3	4	1	1	2	4
University of Reading	229	2	2	3	3	1	2	2	3
Bauman Moscow State Technical University	230	2	3	3	5	1	4	2	2
Gadjah Mada University	231	2	3	3	2	1	1	2	2
Radboud University	232	2	2	3	4	1	1	2	4
Queen's University Belfast	233=	2	2	3	3	1	1	2	3
Universitat Pompeu Fabra (Barcelona)	233=	2	2	3	4	1	2	2	3
Bandung Institute of Technology (ITB)	235=	2	3	3	2	1	2	2	2
"University of California, Irvine"	235=	2	2	3	3	1	1	2	3
King Saud University	237=	2	2	3	3	1	1	2	2
University of Cape Town	237=	2	2	3	2	1	1	3	4
University of Ottawa	237=	2	2	3	1	1	1	3	3
University of Sussex	240=	2	2	3	3	1	1	3	3
USI—Università della Svizzera italiana	240=	2	2	3	3	1	2	3	3
University of Calgary	242	2	2	3	3	1	1	3	3
Universidad Nacional de Colombia	243=	2	4	3	2	1	1	3	2
Università di Padova	243=	2	4	3	4	1	1	3	2
University of Notre Dame	243=	2	3	3	2	1	2	3	2
Queen's University at Kingston	246=	2	2	3	2	1	1	3	4
Universitas Indonesia	248=	2	1	3	2	1	1	3	2
Université Paris Cité	248=	2	4	3	4	1	2	3	4
Indian Institute of Technology Madras (IITM)	250	2	4	3	4	1	2	3	2
Vrije Universiteit Brussel (VUB)	251	2	2	3	3	1	1	3	2
American University of Beirut (AUB)	252	2	2	3	3	1	1	3	2
University of Massachusetts Amherst	253=	2	2	3	4	1	2	3	4
University of Navarra	253=	2	3	3	2	1	1	3	2
University of Virginia	253=	2	3	3	2	1	1	3	2
Loughborough University	256=	2	2	3	3	1	2	3	3
Mahidol University	256=	2	3	3	5	1	1	3	5
Universiti Brunei Darussalam (UBD)	256=	2	2	3	3	1	2	3	3
Sciences Po	259	2	3	3	5	1	2	3	5
Novosibirsk State University	260=	2	3	3	5	1	2	3	5
Tel Aviv University	260=	2	4	3	4	1	1	3	4
Beijing Normal University	262=	2	4	3	4	1	2	3	4
The University of Arizona	262=	2	3	3	5	1	1	3	2
Indian Institute of Technology Kanpur (IITK)	264=	2	4	3	4	1	2	3	4
Tomsk State University	264=	2	3	3	5	1	4	3	5
Deakin University	266	2	2	3	3	1	1	3	3
Moscow Institute of Physics and Technology (MIPT/Moscow Phystech)	267=	2	3	3	5	1	2	3	5
Rutgers University–New Brunswick	267=	2	3	3	2	1	2	3	2
Sun Yat-sen University	267=	2	3	3	4	1	1	3	2
Indian Institute of Technology Kharagpur (IIT-KGP)	270=	2	7	3	4	1	2	3	4
Kyung Hee University	270=	2	3	3	5	1	1	3	5
National University of Ireland Galway	270=	2	2	3	3	1	1	3	2
Saint Petersburg State University	270=	2	3	3	5	1	1	3	2
University of Porto	274	2	4	3	4	1	1	3	2
Technical University of Darmstadt	275=	2	2	3	3	1	2	3	3
Victoria University of Wellington	275=	2	2	3	3	1	2	3	3
L.N. Gumilyov Eurasian National University (ENU)	277	2	3	3	5	1	4	3	5
Maastricht University	278	2	2	3	3	1	3	3	3
University of Leicester	279	2	2	3	3	1	1	3	3
University of Antwerp	280	2	2	3	3	1	1	3	3
Georgetown University	281=	2	3	3	2	1	1	3	2
Heriot-Watt University	281=	2	2	3	3	1	2	3	3
Hong Kong Baptist University	281=	2	2	3	3	1	2	3	3
Graz University of Technology	284=	2	3	3	5	1	2	3	5
Taylor's University	284=	2	3	3	3	1	2	3	3
UCSI University	284=	2	2	3	3	1	2	3	3
University of Canterbury | Te Whare Wānanga o Waitaha	284	2	2	3	3	1	2	3	3
University of Warsaw	284=	2	3	3	2	1	2	3	2
Belarusian State University	288=	2	3	3	5	1	4	3	5
Charles University	288=	2	3	3	2	1	1	3	2
Gwangju Institute of Science and Technology (GIST)	288=	2	4	3	4	1	2	3	4
University of Turku	291	2	3	3	5	1	1	3	2
Massey University	292	2	2	3	3	1	2	3	3
Jagiellonian University	293=	2	3	3	2	1	1	3	2

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
University of Tasmania	293=	2	2	3	3	1	3	3	3
RUDN University	295	2	3	3	5	1	1	3	5
Swinburne University of Technology	296=	2	2	3	3	1	2	3	3
United Arab Emirates University	296=	2	2	3	3	1	1	3	2
University of Miami	296=	2	3	3	5	1	1	3	2
University of Tartu	296=	2	3	3	5	1	1	3	2
Griffith University	300=	2	2	3	3	1	1	3	3
Université Paris 1 Panthéon-Sorbonne	300=	2	4	3	2	1	2	3	6
Xi'an Jiaotong University	302	2	4	3	4	1	1	3	4
University College Cork	303	2	2	3	3	1	1	3	2
University of Macau	304	2	2	3	3	1	2	3	3
University of Surrey	305	2	2	3	3	1	3	3	3
Huazhong University of Science and Technology	306	2	4	3	4	1	1	3	4
Tianjin University	307	2	4	3	4	1	2	3	4
Dalhousie University	308=	2	2	3	3	1	1	3	3
HSE University	308=	2	3	3	5	1	4	3	5
National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)	308=	2	3	3	5	1	2	3	5
Universität Innsbruck	308=	2	2	3	3	1	1	3	2
North Carolina State University	312=	2	2	3	4	1	2	3	4
Tufts University	312=	2	3	3	5	1	1	3	2
University of Tsukuba	312=	2	3	3	5	1	1	3	5
La Trobe University	316	2	2	3	3	1	3	3	3
Université Grenoble Alpes	317=	2	4	3	4	1	1	3	4
University of Colorado Boulder	317=	2	3	3	4	1	2	3	4
University of Illinois at Chicago (UIC)	317=	2	3	3	6	1	1	3	2
Linköping University	320=	2	2	3	3	1	2	3	3
Universidad Carlos III de Madrid (UC3M)	320=	2	3	3	5	1	4	3	5
Kazan (Volga region) Federal University	322	2	3	3	5	1	4	3	5
Pontificia Universidad Católica Argentina	323	2	3	3	5	1	1	3	5
University of Milan	324	2	4	3	4	1	1	3	6
Politecnico di Torino	325=	2	7	3	4	1	2	3	4
University of Strathclyde	325=	2	2	3	3	1	2	3	3
National Taiwan University of Science and Technology (Taiwan Tech)	327	2	3	3	5	1	2	3	7
Goethe-University Frankfurt am Main	328=	2	3	3	6	1	1	3	4
Simon Fraser University	328=	2	2	3	3	1	3	3	3
Aalborg University	330	2	2	3	3	1	1	3	3
University of Waikato	331	2	2	3	3	1	3	3	3
National Taiwan Normal University	332	2	3	3	5	1	2	3	5
Universidade Federal do Rio de Janeiro	333	2	4	3	6	1	1	3	6
National University of Sciences And Technology (NUST) Islamabad	334	2	3	3	5	1	2	3	5
University of Cologne	335=	2	3	3	4	1	1	3	4
University of Lisbon	335=	2	4	3	4	1	1	3	4
Ural Federal University—UrFU	335=	2	3	3	5	1	4	3	5
Hiroshima University	338	2	3	3	5	1	1	3	5
Indiana University Bloomington	339	2	3	3	4	1	1	3	4
Friedrich-Alexander-Universität Erlangen-Nürnberg	340=	2	4	3	4	1	1	3	4
Universiti Teknologi Brunei	340=	2	2	3	5	1	2	3	2
University of East Anglia (UEA)	342	2	2	3	3	1	1	3	3
"Birkbeck, University of London"	343=	2	2	3	3	1	3	3	3
Universitat Politècnica de Catalunya · BarcelonaTech (UPC)	343=	2	3	3	5	1	2	3	5
MGIMO University	345	2	3	3	5	1	4	3	5
Ewha Womans University	346	2	3	3	5	1	1	3	5
IE University	347=	2	2	3	3	1	2	3	3
University of Jyväskylä	347=	2	3	3	5	1	2	3	5
University of Southern Denmark (SDU)	347=	2	2	3	3	1	2	3	3
Johannes Kepler University Linz	350=	2	2	3	5	1	2	3	2
University of Connecticut	350=	2	2	3	4	1	1	3	4
Norwegian University of Science And Technology	352=	2	2	3	4	1	1	3	4
University of Dundee	354	2	2	3	3	1	1	3	3
Beijing Institute of Technology	355=	2	7	3	4	1	2	3	4
"City, University of London"	355=	2	2	3	3	1	3	3	3
Universität Stuttgart	355=	2	4	3	4	1	3	3	4
"University of Chemistry and Technology, Prague"	358	2	3	3	5	1	2	3	5
ITMO University	359=	2	3	3	5	1	4	3	5
University of Victoria (UVic)	359=	2	2	3	3	1	3	3	3

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
Universiti Teknologi PETRONAS (UTP)	361	2	2	3	3	1	3	3	3
George Washington University	362	3	3	3	4	1	1	3	4
Kobe University	363=	3	3	3	5	1	1	3	5
Pontificia Universidad Católica del Perú	363=	3	7	3	7	1	2	3	7
Quaid-i-Azam University	363=	3	5	3	4	1	2	3	4
University of South Australia	363=	3	2	3	3	1	3	3	3
Virginia Polytechnic Institute and State University	363=	3	2	3	4	1	1	3	4
Lincoln University	368	3	2	3	3	1	2	3	3
Airlangga University	369=	3	3	3	2	1	1	3	2
American University of Sharjah	369=	3	2	3	3	1	3	3	3
Indian Institute of Technology Roorkee (IITR)	369=	3	7	3	4	1	2	3	4
Umea University	369=	3	3	3	5	1	1	3	5
Universidade Nova de Lisboa	369=	3	4	3	4	1	1	3	4
University of Kansas	369=	3	3	3	5	1	1	3	2
"University of California, Santa Cruz"	375=	3	2	3	4	1	2	3	4
University of Kent	375=	3	2	3	3	1	3	3	3
University Ulm	375=	3	3	3	5	1	2	3	5
Czech Technical University in Prague	378=	3	3	3	5	1	4	3	5
Nankai University	378=	3	4	3	4	1	1	3	4
Sharif University of Technology	380=	3	7	3	4	1	2	3	4
University of Hawai'i at Mānoa	380=	3	3	3	4	1	1	3	4
Peter the Great St. Petersburg Polytechnic University	382=	3	3	3	5	1	4	3	5
Pontificia Universidad Javeriana	382=	3	4	3	2	1	1	3	7
Indian Institute of Technology Guwahati (IITG)	384=	3	6	3	4	1	2	3	4
Sultan Qaboos University	384=	3	2	3	3	1	1	3	2
Taipei Medical University (TMU)	384=	3	3	3	5	1	2	3	7
Westfälische Wilhelms-Universität Münster	384=	3	3	3	6	1	1	3	2
Lappeenranta-Lahti University of Technology LUT	388=	3	7	3	4	1	2	3	4
Northeastern University	388=	3	2	4	3	1	3	3	3
Universidad de Palermo (UP)	390=	3	3	4	5	1	4	3	5
Chung-Ang University (CAU)	392=	3	3	4	5	1	1	3	5
Tokyo Medical and Dental University (TMDU)	392=	3	3	4	5	1	2	3	5
University of Oulu	392=	3	2	4	4	1	1	3	4
University of Utah	392=	3	3	4	5	1	1	3	2
Shandong University	396=	3	4	4	4	1	1	3	4
National Research Tomsk Polytechnic University	398=	3	3	4	5	1	4	3	5
Tilburg University	398=	3	2	4	3	1	2	3	3
Universitat Politècnica de València	400=	3	3	4	5	1	2	3	5
Vilnius University	400=	3	3	4	5	1	1	3	5
Colegio de México	402=	3	3	4	5	1	4	3	5
Royal Holloway University of London	402=	3	2	4	3	1	3	3	3
University of Pisa	404	3	4	4	6	1	1	3	6
Satbayev University	405	3	3	4	5	1	4	3	5
Sichuan University	406=	3	4	4	4	1	6	3	4
South China University of Technology	406=	3	4	4	4	1	6	3	4
Colorado State University	408=	3	3	4	5	1	2	4	5
Technion—Israel Institute of Technology	408=	3	2	4	4	1	1	4	4
HUFS—Hankuk (Korea) University of Foreign Studies	410=	3	3	4	5	1	4	4	5
Julius-Maximilians-Universität Würzburg	410=	3	4	4	4	1	1	4	4
Brunel University London	412=	3	2	4	3	1	3	4	3
University of Johannesburg	412=	3	2	4	3	1	2	4	3
University of the Philippines	412=	3	3	4	6	1	1	4	2
Tampere University	415	3	4	4	4	1	1	4	4
Ruhr-Universität Bochum	416=	3	4	4	4	1	1	4	4
"Stony Brook University, State University of New York"	416=	3	3	4	3	1	1	4	4
The American University in Cairo	416=	3	2	4	3	1	2	4	2
University of Naples—Federico II	416=	3	4	4	4	1	1	4	6
Johannes Gutenberg Universität Mainz	420=	3	3	4	6	1	1	4	4
National Technical University of Athens	422=	3	7	4	4	1	2	4	4
Shanghai University	422=	3	3	4	5	1	2	4	5
Xiamen University	422=	3	4	4	4	1	1	4	4
Flinders University	425=	3	2	4	3	1	1	4	3
Swansea University	425=	3	2	4	3	1	1	4	2
University at Buffalo SUNY	425=	3	2	4	4	1	1	4	3
National Sun Yat-sen University	428=	3	4	4	7	1	2	4	7
"University of Colorado, Denver"	428=	3	3	4	5	1	1	4	5
University of Science and Technology Beijing	428=	3	6	4	4	1	6	4	4

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
University of Witwatersrand	428=	3	2	4	4	1	1	4	4
Universidad Austral	432	3	3	4	5	1	4	4	5
Université Laval	433	3	2	4	3	1	1	4	2
Far Eastern Federal University	434=	3	3	4	5	1	4	4	5
Université de Strasbourg	434=	3	4	4	6	1	1	4	4
National Taipei University of Technology	436=	3	4	4	7	1	2	4	7
Università Vita-Salute San Raffaele	436=	3	3	4	5	1	2	4	5
Oxford Brookes University	438=	3	2	4	3	1	2	4	3
University of Coimbra	438=	3	4	4	4	1	1	4	6
Wake Forest University	438=	3	3	4	5	1	1	4	5
Universidade Federal de São Paulo	441=	3	3	4	5	1	1	4	5
Universität des Saarlandes	441=	3	3	4	5	1	1	4	5
Amirkabir University of Technology	443=	3	7	4	4	1	2	4	4
Auezov South Kazakhstan University (SKU)	443=	3	3	4	5	1	4	4	5
Beihang University (former BUAA)	443=	3	4	4	4	1	6	4	4
Illinois Institute of Technology	443=	3	4	4	3	1	3	4	4
SOAS University of London	443=	3	2	4	3	2	3	4	3
Washington State University	443=	3	2	4	4	2	1	4	4
Bogor Agricultural University	449=	3	3	4	5	2	4	4	5
Hasselt University	449=	3	3	4	5	2	2	4	2
Umm Al-Qura University	449=	3	2	4	3	2	1	4	2
Universidad de Montevideo (UM)	449=	3	3	4	5	2	1	4	5
"University of California, Riverside"	453	3	2	4	4	2	1	4	4
Stellenbosch University	454=	3	4	4	4	2	1	4	6
University of Tromsø The Arctic University of Norway	454=	3	3	4	5	2	1	4	2
York University	456	3	2	4	3	2	3	4	3
Institut National des Sciences Appliquées de Lyon (INSA)	457=	3	3	4	3	2	2	4	4
Sogang University	457=	3	3	4	5	2	4	4	7
University of Trento	457=	3	4	4	4	2	2	4	4
University of Florence	460	3	4	4	4	2	1	4	6
James Cook University	461=	3	2	4	4	2	1	4	4
Rensselaer Polytechnic Institute	461=	3	4	4	4	2	3	4	4
Southeast University	461=	3	4	4	4	2	6	4	4
Universidad de Belgrano	461=	3	3	4	5	2	4	4	5
"Essex, University of"	465=	3	2	4	3	2	3	4	3
Universidad de Santiago de Chile (USACH)	465=	3	4	4	6	2	1	4	7
The National University of Science and Technology MISIS	467=	3	3	4	5	2	2	4	5
Universidad de La Habana	467=	3	3	4	5	2	4	4	5
University of Iowa	467=	3	3	4	6	2	1	4	2
Dublin City University	471=	3	2	4	3	2	1	4	3
Tulane University	471=	3	3	4	5	2	1	4	5
University of Cyprus (UCY)	473=	3	2	4	3	2	2	4	4
University of Saskatchewan	473=	3	2	4	3	2	1	4	3
Chang Gung University	475=	3	3	4	5	2	2	4	5
University of Turin	475=	3	5	4	6	2	1	4	6
Imam Abdulrahman Bin Faisal University (IAU) (formerly UNIVERSITY OF DAMMAM)	477=	3	2	4	5	2	1	4	2
Koç University	477=	3	3	4	6	2	1	4	7
UNESP	477=	3	4	4	6	2	1	4	6
Bond University	481=	3	2	4	3	2	1	4	3
Dongguk University	481=	3	3	4	5	2	1	4	5
Iowa State University	481=	3	5	4	4	2	3	4	4
Kazakh National Agrarian University KazNAU	481=	3	3	4	5	2	4	4	5
Universiti Utara Malaysia (UUM)	481=	3	7	4	7	2	4	4	5
Auckland University of Technology (AUT)	486=	3	2	4	3	2	3	4	3
University of Klagenfurt	486=	3	2	4	3	2	2	4	3
Ajou University	488=	3	3	4	5	2	1	4	5
Universidad Politécnica de Madrid (UPM)	488=	3	7	4	7	2	2	4	7
Aix-Marseille University	490=	3	4	4	6	2	1	4	6
Ben-Gurion University of The Negev	490=	3	2	4	4	2	1	4	4
Chiba University	490=	3	3	4	5	2	1	4	5
Justus-Liebig-University Giessen	490=	3	4	4	4	2	1	4	4
The Catholic University of Korea	494=	3	3	4	5	2	7	4	5
Universidad ORT Uruguay	494=	3	3	4	5	2	4	4	5
University of Granada	494=	3	4	4	6	2	1	4	6
Brandeis University	497=	3	3	4	5	2	2	4	5

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
Jilin University	497=	3	3	4	6	2	1	4	2
Central South University	499=	3	5	4	4	2	6	4	4
University of Rome Tor Vergata	499=	3	7	4	7	2	2	4	7
Western Sydney University	501–510	3	2	4	3	2	1	4	3
Bar-Ilan University	501–510	3	4	4	4	2	1	4	4
Colorado School of Mines	501–510	3	7	4	4	2	2	4	4
Kyungpook National University	501–510	3	3	4	5	2	1	4	5
Middle East Technical University	501–510	3	5	4	6	2	2	4	7
Missouri University of Science and Technology	501–510	3	2	4	4	2	2	4	4
Université de Montpellier	501–510	3	7	4	4	2	3	4	4
University of Aveiro	501–510	3	7	4	4	2	6	4	4
University of St.Gallen (HSG)	501–510	3	2	4	3	2	2	4	3
University of Stirling	501–510	3	2	4	3	2	3	4	4
University of Tehran	501–510	3	6	4	4	2	2	4	6
Yokohama City University	501–510	3	3	4	5	2	7	4	5
Abai Kazakh National Pedagogical University	511–520	3	3	4	5	2	4	4	5
Florida State University	511–520	3	4	4	6	2	1	4	6
“Goldsmiths, University of London”	511–520	3	2	4	3	2	3	4	3
Universidad de Alcalá	511–520	3	3	4	5	2	1	4	4
Università Cattolica del Sacro Cuore	511–520	3	7	4	7	2	4	4	7
University of Bayreuth	511–520	3	3	4	5	2	2	4	3
University of Canberra	511–520	3	2	4	3	2	3	4	3
“University of Missouri, Columbia”	511–520	3	3	5	6	2	1	4	4
Altai State University	521–530	3	3	5	5	2	4	4	5
The New School	521–530	3	3	5	5	2	4	4	5
Université de Liège	521–530	3	4	5	4	2	1	4	4
University of Bordeaux	521–530	3	7	5	6	2	2	4	6
University of Delhi	521–530	3	5	5	6	2	1	4	6
University of Texas Dallas	521–530	3	4	5	4	2	1	4	4
Warsaw University of Technology	521–530	3	7	5	7	2	2	4	7
Hitotsubashi University	531–540	3	7	5	7	2	2	4	7
Inha University	531–540	3	3	5	5	2	1	4	5
Sabanci University	531–540	3	4	5	7	2	3	4	7
Saint Joseph University of Beirut (USJ)	531–540	3	2	5	3	2	1	4	2
“Universidad Central “Marta Abreu” de Las Villas”	531–540	3	3	5	5	2	7	4	5
University of Balamand	531–540	3	3	5	5	2	4	4	5
University of Limerick	531–540	3	2	5	3	2	1	4	3
Canadian University Dubai	541–550	3	2	5	3	2	3	4	3
East China Normal University	541–550	3	4	5	4	2	3	4	4
Savitribai Phule Pune University	541–550	3	3	5	5	2	2	4	5
Southern Federal University	541–550	3	3	5	5	2	4	4	5
Universidad Nacional de La Plata (UNLP)	541–550	3	4	5	6	2	1	4	6
Universidad Panamericana (UP)	541–550	3	3	5	5	2	4	4	5
Universität Konstanz	541–550	3	2	5	3	2	2	4	3
Universität Mannheim	541–550	3	7	5	4	2	2	4	4
V. N. Karazin Kharkiv National University	541–550	3	3	5	5	2	4	4	4
Cairo University	551–560	3	5	5	6	2	1	4	6
Concordia University	551–560	3	2	5	3	2	3	4	3
Jeonbuk National University	551–560	3	3	5	5	2	1	4	5
Masaryk University	551–560	3	4	5	3	2	3	4	4
National Research Saratov State University	551–560	3	3	5	5	2	4	4	5
Northwestern Polytechnical University	551–560	3	4	5	4	2	6	4	5
Sejong University	551–560	3	4	5	4	2	3	4	7
Universidad de Zaragoza	551–560	3	3	5	6	2	1	4	5
University of Eastern Finland	551–560	3	4	5	7	2	2	4	7
University of Szeged	551–560	3	3	5	5	2	1	4	4
Almaty Technological University	561–570	3	3	5	5	2	4	4	5
Applied Science University—Bahrain	561–570	3	2	5	3	2	3	4	3
Aston University	561–570	3	2	5	3	2	3	4	3
Bilkent University	561–570	3	2	5	7	2	3	4	3
Boston College	561–570	3	4	5	6	2	3	4	6
Dalian University of Technology	561–570	3	5	5	4	2	6	4	4
Murdoch University	561–570	3	2	5	3	2	3	4	3
Niigata University	561–570	3	3	5	5	2	7	4	5
Singapore Management University	561–570	3	2	5	3	2	3	4	3
“Sofia University “St. Kliment Ohridski””	561–570	3	3	5	5	2	4	4	5
Universidad de Sevilla	561–570	3	4	5	6	2	1	4	6

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
Università degli Studi di Pavia	561–570	3	4	5	4	2	1	4	6
University of Electronic Science and Technology of China	561–570	3	6	5	4	2	6	4	4
University of Ulsan	561–570	3	3	5	5	2	1	4	5
Hallym University	571–580	3	3	5	5	2	7	4	5
Holy Spirit University of Kaslik	571–580	3	2	5	3	2	1	4	2
Nagasaki University	571–580	3	3	5	5	2	7	4	5
Universitat de Valencia	571–580	3	5	5	6	2	1	4	6
Université de Fribourg	571–580	3	2	5	3	2	3	4	3
Université du Québec	571–580	3	4	5	4	2	1	4	4
Indian Institute of Technology Hyderabad	581–590	3	7	5	4	2	6	4	7
Macau University of Science and Technology	581–590	3	2	5	3	2	3	4	3
National Central University	581–590	3	4	5	7	2	3	4	7
Shenzhen University	581–590	3	3	5	5	2	6	4	5
Université Paul Sabatier Toulouse III	581–590	3	7	5	7	2	2	4	7
University of Delaware	581–590	3	4	5	4	2	3	4	4
University of Massachusetts Boston	581–590	3	7	5	4	2	6	4	4
China Agricultural University	591-600	4	4	5	4	2	6	4	7
Hunan University	591-600	4	6	5	4	2	6	4	4
Lehigh University	591-600	4	4	5	4	2	3	4	4
Politecnico di Bari	591-600	4	7	5	7	2	6	4	4
Sungshin Women's University	591-600	4	3	5	5	2	7	4	5
University of Crete	591-600	4	5	5	4	2	1	4	7
University of Guelph	591-600	4	4	5	4	2	2	4	4
University of Jordan	591-600	4	4	5	6	2	1	4	4
University of Minho	591-600	4	4	5	6	2	1	4	5
University of Pretoria	591-600	4	4	5	6	2	1	4	6
Abo Akademi University	601–650	4	4	5	4	2	3	4	4
Al Ain University	601–650	4	2	5	3	2	3	4	3
Bangor University	601–650	4	2	5	3	2	1	4	4
Carleton University	601–650	4	4	5	4	2	3	5	4
Chiang Mai University	601–650	4	5	5	6	2	1	5	6
East China University of Science and Technology	601–650	4	7	5	4	2	6	5	4
Edith Cowan University	601–650	4	2	5	3	2	3	5	3
Gifu University	601–650	4	3	5	5	2	7	5	5
Immanuel Kant Baltic Federal University	601–650	4	3	5	5	2	4	5	5
Istanbul Technical University	601–650	4	7	5	7	2	2	5	7
Ivane Javakhishvili Tbilisi State University	601–650	4	3	5	5	2	7	5	5
Kanazawa University	601–650	4	3	5	5	2	1	5	5
"Kingston University, London"	601–650	4	2	5	3	2	3	5	3
Lahore University of Management Sciences (LUMS)	601–650	4	4	5	7	2	5	5	7
Lebanese American University	601–650	4	2	5	3	2	1	5	3
Lebanese University	601–650	4	4	5	6	2	1	5	4
Leibniz University Hannover	601–650	4	4	5	6	2	2	5	4
"Lingnan University, Hong Kong"	601–650	4	2	5	3	2	3	5	3
Management and Science University	601–650	4	2	5	3	2	3	5	3
National and Kapodistrian University of Athens	601–650	4	5	5	6	2	1	5	6
National Chengchi University	601–650	4	4	5	7	2	4	5	7
Okayama University	601–650	4	3	5	5	2	7	5	5
Oregon State University	601–650	4	4	5	6	2	3	5	6
Osaka City University	601–650	4	3	5	5	2	7	5	5
Pontifícia Universidade Católica do Rio de Janeiro	601–650	4	7	5	7	3	2	5	7
Pusan National University	601–650	4	4	5	6	3	1	5	5
Renmin (People's) University of China	601–650	4	7	5	7	3	2	5	7
Samara National Research University (Samara University)	601–650	4	3	5	5	3	4	5	5
St. Louis University	601–650	4	3	5	5	3	7	5	5
Sunway University	601–650	4	3	5	7	3	4	5	7
The University of Georgia	601–650	4	4	5	6	3	1	5	6
"The University of Tennessee, Knoxville"	601–650	4	4	5	4	3	1	5	6
Ulster University	601–650	4	2	5	3	3	3	5	3
Universidad Anáhuac México	601–650	4	3	5	5	3	4	5	5
Universidad de Concepción	601–650	4	4	5	6	3	5	5	7
Universidad Pontificia Bolivariana	601–650	4	3	5	5	3	4	5	5
Universidad Pontificia Comillas	601–650	4	7	5	7	3	2	5	7
Universität Bremen	601–650	4	4	5	6	3	3	5	4
Universität Potsdam	601–650	4	4	5	7	3	3	5	4
Université Claude Bernard Lyon 1	601–650	4	4	5	6	3	1	5	6
University of Ljubljana	601–650	4	4	5	6	3	1	5	6

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
University of Milano-Bicocca	601–650	4	7	5	7	3	6	5	4
University of Salamanca	601–650	4	4	5	6	3	1	5	7
University of Sharjah	601–650	4	2	5	3	3	3	5	3
University of South Florida	601–650	4	4	5	4	3	3	5	4
Wayne State University	601–650	4	3	5	5	3	1	5	5
Aberystwyth University	651–700	4	2	5	3	3	3	5	4
Abu Dhabi University	651–700	4	2	5	3	3	3	5	3
Ahlia University	651–700	4	2	5	3	3	3	5	3
Ajman University	651–700	4	2	5	3	3	3	5	3
Alfaisal University	651–700	4	2	5	3	3	3	5	3
American University in Dubai	651–700	4	2	5	3	3	3	5	3
Aristotle University of Thessaloniki	651–700	4	5	5	6	3	1	5	6
Ateneo de Manila University	651–700	4	4	5	6	3	1	5	7
Central Queensland University (CQUniversity Australia)	651–700	4	2	5	3	3	3	5	3
China University of Geosciences	651–700	4	7	5	7	3	6	5	7
Chongqing University	651–700	4	7	5	4	3	6	5	4
Comenius University in Bratislava	651–700	4	7	5	5	3	4	5	7
Coventry University	651–700	4	2	5	3	3	3	5	3
Drexel University	651–700	4	4	5	6	3	1	5	6
Gunma University	651–700	4	3	5	5	3	7	5	5
Indian Institute of Technology (BHU) Varanasi	651–700	4	7	5	4	3	6	5	4
International Islamic University Malaysia (IIUM)	651–700	4	4	5	6	3	1	5	4
Karaganda State Technical University	651–700	4	3	5	5	3	4	5	5
Karl-Franzens-Universitaet Graz	651–700	4	4	5	6	3	3	5	4
Konkuk University	651–700	4	3	5	5	3	1	5	5
Kumamoto University	651–700	4	3	5	5	3	7	5	5
National Chung Hsing University	651–700	4	6	5	6	3	3	5	5
"National Technical University "Kharkiv Polytechnic Institute""	651–700	4	3	5	5	3	4	5	5
New Jersey Institute of Technology (NJIT)	651–700	4	2	5	3	3	3	5	3
Northumbria University at Newcastle	651–700	4	2	5	3	3	3	5	3
O.P. Jindal Global University	651–700	4	3	5	7	3	4	5	7
Palacký University Olomouc	651–700	4	4	5	7	3	3	5	6
Plekhanov Russian University of Economics	651–700	4	7	5	7	3	4	5	7
Prince Mohammad Bin Fahd university	651–700	4	2	5	3	3	3	5	3
S.D. Asfendiyarov Kazakh National Medical University	651–700	4	3	5	7	3	4	5	5
Sechenov University	651–700	4	3	5	5	3	4	5	5
Soochow University	651–700	4	7	5	4	3	6	5	4
Taras Shevchenko National University of Kyiv	651–700	4	5	5	6	3	4	5	7
Thammasat University	651–700	4	4	5	6	3	1	5	6
Universidad de Antioquia	651–700	4	5	5	6	3	5	5	6
Universidad Externado de Colombia	651–700	4	7	5	7	3	2	5	7
Universidad ICESI	651–700	4	3	6	5	3	7	5	5
Universidad Peruana Cayetano Heredia (UPCH)	651–700	4	3	6	5	3	7	5	5
Universitat Ramon Llull	651–700	4	2	6	3	3	2	5	3
Universiti Teknologi MARA—UiTM	651–700	4	5	6	6	3	5	5	7
University of Debrecen	651–700	4	4	6	6	3	1	5	4
University of Genoa	651–700	4	5	6	6	3	1	5	6
University of Huddersfield	651–700	4	2	6	3	3	3	5	3
University of Hull	651–700	4	2	6	3	3	1	5	4
University of Nebraska—Lincoln	651–700	4	4	6	4	3	3	5	4
University of Plymouth	651–700	4	4	6	4	3	1	5	4
University of Southern Queensland	651–700	4	2	6	3	3	3	5	3
American University	701–750	4	5	6	7	3	4	5	7
American University of the Middle East	701–750	4	2	6	3	3	3	5	3
Boğaziçi University	701–750	4	6	6	6	3	5	5	7
Brno University of Technology	701–750	4	7	6	7	3	4	5	4
Charles Darwin University	701–750	4	2	6	3	3	3	5	3
City University of New York	701–750	4	5	6	6	3	1	5	6
Eötvös Loránd University	701–750	4	7	6	6	3	2	5	6
Free University of Bozen-Bolzano	701–750	4	2	6	3	3	3	5	3
Institut Teknologi Sepuluh Nopember (ITS Surabaya)	701–750	4	7	6	7	3	4	5	7
Jinan University (China)	701–750	4	2	6	3	3	1	5	4
Jouf University	701–750	4	2	6	3	3	1	5	3
Kagoshima University	701–750	4	3	6	5	3	7	5	5
Khoja Akhmet Yassawi International Kazakh-Turkish University	701–750	4	3	6	5	3	1	5	5
King Khalid University	701–750	4	2	6	3	3	1	5	3

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
"National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute""	701–750	4	7	6	7	3	4	5	7
Pavol Jozef Šafárik University in Košice	701–750	4	3	6	5	3	1	5	4
Princess Nourah bint Abdulrahman University	701–750	4	2	6	3	3	3	5	3
Ritsumeikan University	701–750	4	4	6	6	3	2	5	7
Southern Cross University	701–750	4	2	6	3	3	3	5	3
Stevens Institute of Technology	701–750	4	4	6	3	3	3	5	4
Tallinn University of Technology (TalTech)	701–750	4	7	6	7	3	3	5	7
Tokushima University	701–750	4	3	6	5	3	7	5	5
Tokyo Metropolitan University	701–750	4	7	6	7	3	6	5	7
Tokyo University of Agriculture and Technology	701–750	4	7	6	7	3	6	5	7
Universidad Católica del Uruguay (UCU)	701–750	4	4	6	7	3	4	5	7
Universidad de La Sabana	701–750	4	4	6	6	3	5	5	7
Universidad Iberoamericana IBERO	701–750	4	4	6	6	3	1	5	7
Universidad San Francisco de Quito (USFQ)	701–750	4	3	6	7	3	1	5	7
Universidade Federal de Minas Gerais	701–750	4	5	6	6	3	1	5	6
Universiti Tenaga Nasional (UNITEN)	701–750	4	7	6	7	3	2	5	7
University of Bradford	701–750	4	2	6	3	3	3	5	4
University of Cincinnati	701–750	4	4	6	6	3	1	5	6
University of Haifa	701–750	4	7	6	7	3	6	5	7
University of Kentucky	701–750	4	4	6	6	3	1	5	6
University of Mons	701–750	4	7	6	7	3	3	5	7
University of New Brunswick	701–750	4	2	6	3	3	3	5	4
University of New Mexico	701–750	4	4	6	6	3	1	5	6
University of Oklahoma	701–750	4	4	6	6	3	1	5	6
University of Oregon	701–750	4	7	6	6	3	6	5	6
University of Pecs	701–750	4	4	6	6	3	1	5	4
University of Portsmouth	701–750	4	2	6	3	3	3	5	3
University of South Carolina	701–750	4	4	6	6	3	1	5	6
University of the Basque Country	701–750	4	7	6	6	3	6	5	5
University of Trieste	701–750	4	5	6	4	3	1	5	4
University of Vermont	701–750	4	3	6	6	3	1	5	5
University of Westminster	701–750	4	2	6	3	3	3	5	3
Victoria University	701–750	4	2	6	3	3	3	5	3
Vilnius Gediminas Technical University	701–750	4	7	6	7	3	4	5	7
Virginia Commonwealth University	701–750	4	3	6	6	3	1	5	5
Zayed University	701–750	4	2	6	3	3	3	5	3
Beijing University of Technology	751–800	4	7	6	6	3	6	5	5
Belarusian National Technical University (BNTU)	751–800	4	7	6	7	3	4	5	7
Chonnam National University	751–800	4	4	6	6	3	1	5	5
Chungnam National University	751–800	4	4	6	6	3	1	5	5
Clark University	751–800	4	4	6	7	3	3	5	7
CY Cergy Paris University	751–800	4	7	6	3	3	2	6	3
Dankook University	751–800	4	3	6	5	3	7	6	5
Florida International University	751–800	4	4	6	6	3	1	6	6
Howard University	751–800	5	3	6	5	3	7	6	5
Instituto Politécnico Nacional (IPN)	751–800	5	7	6	7	3	5	6	7
Instituto Tecnológico Autónomo de México (ITAM)	751–800	5	2	6	7	3	2	6	7
Instituto Tecnológico de Buenos Aires (ITBA)	751–800	5	4	6	7	3	4	6	7
Keele University	751–800	5	2	6	3	3	1	6	4
Lanzhou University	751–800	5	7	6	6	3	6	6	6
Lobachevsky University	751–800	5	7	6	5	3	4	6	7
"Manipal Academy of Higher Education, Manipal, Karnataka, India"	751–800	5	4	6	6	3	1	6	5
Memorial University of Newfoundland	751–800	5	4	6	6	3	1	6	4
Michigan Technological University	751–800	5	4	6	7	3	6	6	7
Middlesex University	751–800	5	2	6	3	3	3	6	3
Osaka Prefecture University	751–800	5	4	6	5	3	7	6	7
Paris Lodron University of Salzburg	751–800	5	2	6	3	3	3	6	3
Philipps-Universität Marburg	751–800	5	4	6	6	3	1	6	6
Pontificia Universidad Católica de Valparaíso	751–800	5	7	6	6	3	5	6	7
Riga Technical University	751–800	5	4	6	7	3	4	6	4
Saint Petersburg Electrotechnical University ETU-LETI	751–800	5	7	6	5	3	4	6	7
Shiraz University	751–800	5	7	6	4	3	6	6	4
Syracuse University	751–800	5	7	6	6	3	3	6	7
Temple University	751–800	5	5	6	6	3	1	6	6
Universidad Adolfo Ibáñez	751–800	5	7	6	7	3	4	6	7
Universidad Autónoma Chapingo	751–800	5	3	6	5	3	7	6	5

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
Universidad Católica Andres Bello	751–800	5	7	6	7	3	5	6	7
Universidad de la República (Udelar)	751–800	5	4	6	6	3	1	6	6
Universidad de San Andrés—UdeSA	751–800	5	7	6	7	3	4	6	7
Universidad del Rosario	751–800	5	7	6	7	3	5	6	7
Universidade de Santiago de Compostela	751–800	5	7	6	6	3	6	6	6
Universidade Federal do Rio Grande Do Sul	751–800	5	5	6	6	3	1	6	6
Universitas Padjadjaran	751–800	5	7	6	7	3	4	6	6
Universitat Rovira i Virgili	751–800	5	5	6	6	3	1	6	7
Université Côte d\'Azur	751–800	5	4	6	6	3	1	6	4
Université de Lille	751–800	5	7	6	7	3	2	6	7
Université de Sherbrooke	751–800	5	4	6	6	3	1	6	4
Université de Sousse	751–800	5	3	6	5	3	7	6	5
University of Denver	751–800	5	4	6	5	3	7	6	7
University of Houston	751–800	5	7	6	6	3	3	6	6
University of Hyderabad	751–800	5	5	6	6	3	6	6	7
University of Siena	751–800	5	5	6	6	3	1	6	6
Academician Y.A. Buketov Karaganda University	801–1000	5	7	6	7	3	4	6	7
"Adam Mickiewicz University, Poznań"	801–1000	5	7	6	6	3	6	6	6
AGH University of Science and Technology	801–1000	5	7	6	6	3	7	6	5
Ain Shams University	801–1000	5	4	6	6	3	1	6	6
Australian Catholic University	801–1000	5	2	6	3	3	3	6	3
Beijing Foreign Studies University	801–1000	5	7	6	7	3	4	6	7
Beijing Jiaotong University	801–1000	5	7	6	7	3	6	6	7
Beijing University of Posts and Telecommunications	801–1000	5	7	6	7	3	6	6	7
Beirut Arab University	801–1000	5	2	6	3	3	1	6	3
Bournemouth University	801–1000	5	2	6	3	3	3	6	3
Budapest University of Technology and Economics	801–1000	5	7	6	7	3	3	6	7
Ca' Foscari University of Venice	801–1000	5	7	6	7	3	3	6	6
Catania University	801–1000	5	6	6	6	3	1	6	6
Chandigarh University	801–1000	5	7	6	7	3	4	6	7
Chang Jung Christian University	801–1000	5	7	6	7	3	7	6	7
Charles Sturt University	801–1000	5	7	6	3	3	3	6	3
Clarkson University	801–1000	5	4	6	4	3	3	6	4
Clemson University	801–1000	5	7	6	6	3	3	6	6
College of William and Mary	801–1000	5	7	6	7	4	3	6	7
Cracow University of Technology (Politechnika Krakowska)	801–1000	5	7	6	7	4	5	6	7
Czech University of Life Sciences in Prague	801–1000	5	7	6	7	4	3	6	4
De La Salle University	801–1000	5	7	6	6	4	5	6	7
De Montfort University	801–1000	5	2	6	3	4	3	6	3
Diponegoro University	801–1000	5	5	6	6	4	1	6	6
Donghua University	801–1000	6	7	6	7	4	6	6	7
Duy Tan University	801–1000	6	7	6	7	4	3	6	4
Edinburgh Napier University	801–1000	6	2	6	3	4	3	6	3
Gdańsk University of Technology	801–1000	6	7	6	7	4	7	6	7
Georgia State University	801–1000	6	7	6	6	4	3	6	6
German Jordanian University	801–1000	6	7	6	7	4	3	6	3
Gulf University for Science and Technology	801–1000	6	2	6	3	4	3	6	3
Hacettepe University	801–1000	6	6	6	6	4	5	6	6
Harbin Engineering University	801–1000	6	7	6	7	4	6	6	7
Indian Institute of Technology Bhubaneswar	801–1000	6	7	6	7	4	6	6	7
Indiana University–Purdue University Indianapolis	801–1000	6	4	6	6	4	1	6	4
Instituto Tecnológico de Santo Domingo (INTEC)	801–1000	6	7	6	7	4	4	6	7
International Christian University	801–1000	6	2	6	3	4	3	6	3
Islamic University of Madinah	801–1000	6	2	6	3	4	3	6	3
Istanbul University	801–1000	6	5	6	6	4	1	6	6
"ITESO, Universidad Jesuita de Guadalajara"	801–1000	6	7	6	7	4	7	6	7
Jamia Millia Islamia	801–1000	6	7	6	7	4	6	6	7
Jordan University of Science & Technology	801–1000	6	7	6	7	4	4	6	7
Kansas State University	801–1000	6	4	6	6	4	3	6	4
Kasetsart University	801–1000	6	7	6	6	4	5	6	6
Kaunas University of Technology	801–1000	6	7	6	7	4	4	6	7
Kazakh-British Technical University	801–1000	6	7	6	7	4	5	6	7
Khon Kaen University	801–1000	6	5	6	6	4	5	6	6
King Faisal University	801–1000	6	2	6	3	4	3	6	3
King Mongkut's University of Technology Thonburi	801–1000	6	7	6	7	4	5	6	7
Kyrgyz-Turkish Manas University	801–1000	6	2	6	3	4	3	6	3
Liverpool John Moores University	801–1000	6	4	6	7	4	3	6	4

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
Lodz University of Technology	801–1000	6	7	6	7	4	7	6	7
London Metropolitan University	801–1000	6	2	6	3	4	3	6	3
London South Bank University	801–1000	6	2	6	3	4	3	6	3
Louisiana State University	801–1000	6	7	6	6	4	6	6	6
Loyola University Chicago	801–1000	6	5	6	6	4	1	6	6
Lviv Polytechnic National University	801–1000	6	7	6	6	4	7	6	5
Manchester Metropolitan University (MMU)	801–1000	6	4	6	6	4	3	6	4
Maynooth University	801–1000	6	2	6	3	4	3	6	3
Mendel University in Brno	801–1000	6	7	6	7	4	4	6	7
Nanjing University of Aeronautics and Astronautics	801–1000	6	7	6	7	4	6	6	7
National Chung Cheng University	801–1000	6	7	6	7	4	4	6	7
Nicolaus Copernicus University	801–1000	6	4	6	6	4	7	6	5
NJSC KIMEP University	801–1000	6	2	6	3	4	3	6	3
Northwest University (China)	801–1000	6	4	6	5	4	7	6	5
Notre Dame University-Louaize NDU	801–1000	6	2	6	3	4	3	6	3
Nottingham Trent University	801–1000	6	2	6	3	4	3	6	4
Novosibirsk State Technical University	801–1000	6	7	6	7	4	4	6	7
Oklahoma State University	801–1000	6	4	6	6	4	1	6	4
Perm State National Research University	801–1000	6	7	6	7	4	7	6	7
Pondicherry University	801–1000	6	7	6	7	4	6	6	7
Pontificia Universidad Católica del Ecuador (PUCE)	801–1000	6	5	6	6	4	1	6	6
Pontifícia Universidade Católica de São Paulo	801–1000	6	5	6	6	4	1	6	7
Poznań University of Technology	801–1000	6	7	6	7	4	7	6	7
Prince of Songkla University	801–1000	6	5	6	6	4	5	6	6
Princess Sumaya University for Technology	801–1000	6	7	6	7	4	3	6	3
Qassim University	801–1000	6	2	6	3	4	1	6	3
"Queen Margaret University , Edinburgh"	801–1000	6	2	6	3	4	3	6	3
Riga Stradins University	801–1000	6	7	6	7	4	4	6	4
Ritsumeikan Asia Pacific University	801–1000	6	2	6	3	4	3	6	3
Robert Gordon University	801–1000	6	2	6	3	4	3	6	3
Russian Presidential Academy of National Economy and Public Administration	801–1000	6	7	6	7	4	7	6	7
Russian-Armenian (Slavonic) State University	801–1000	6	7	6	7	4	3	6	4
Rutgers University–Newark	801–1000	6	7	6	7	4	3	6	7
Saint-Petersburg Mining University	801–1000	6	7	6	7	4	4	6	7
Shinshu University	801–1000	6	5	6	6	4	7	6	7
Shoolini University of Biotechnology and Management Sciences	801–1000	6	7	6	7	4	3	6	7
Slovak University of Technology in Bratislava	801–1000	6	7	6	7	4	7	6	7
Sophia University	801–1000	6	4	6	6	4	4	6	6
South Ural State University (National Research University)	801–1000	6	7	6	7	4	4	6	5
Southern Methodist University	801–1000	6	7	6	7	4	6	6	7
Sumy State University	801–1000	6	4	6	5	4	1	6	4
Széchenyi István University	801–1000	6	6	6	7	4	1	6	7
Szent Istvan University	801–1000	6	7	6	7	4	4	6	7
Technical University of Kosice	801–1000	6	7	6	7	4	4	6	7
Technical University of Liberec	801–1000	6	7	6	7	4	4	6	7
Technological University Dublin	801–1000	6	7	6	7	4	3	6	4
Tecnológico de Costa Rica -TEC	801–1000	6	7	6	7	4	5	6	7
Tokyo University of Science	801–1000	6	7	6	7	4	5	6	7
TU Dortmund University	801–1000	6	7	6	6	4	3	6	6
Ufa State Aviation Technical University	801–1000	6	7	6	7	4	7	6	5
Universidad Autónoma del Estado de Hidalgo (UAEH)	801–1000	6	3	6	6	4	7	6	5
Universidad Autónoma del Estado de México (UAEMex)	801–1000	6	6	6	6	4	5	6	6
Universidad Autónoma Metropolitana (UAM)	801–1000	6	6	6	6	4	5	6	7
Universidad de Guadalajara (UDG)	801–1000	6	5	6	6	4	1	6	6
Universidad de las Américas Puebla (UDLAP)	801–1000	7	4	6	6	4	1	6	7
Universidad de Los Andes—(ULA) Mérida	801–1000	7	5	6	6	4	1	6	6
Universidad de los Andes—Chile	801–1000	7	5	6	6	4	5	6	7
Universidad del Valle	801–1000	7	6	6	6	4	5	6	6
Universidad Diego Portales (UDP)	801–1000	7	5	6	6	4	5	6	7
Universidad EAFIT	801–1000	7	7	6	7	4	5	6	7
Universidad Nacional de Córdoba—UNC	801–1000	7	7	6	6	4	5	6	6
Universidad Simón Bolívar (USB)	801–1000	7	7	6	7	4	5	6	7
Universidad Torcuato Di Tella	801–1000	7	7	6	7	4	4	6	7
Universidade Católica Portuguesa—UCP	801–1000	7	6	6	6	4	1	6	7
Universidade de Brasília	801–1000	7	5	6	6	4	1	6	6

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
Universidade Federal de Santa Catarina	801–1000	7	5	6	6	4	1	6	6
Universidade Federal de São Carlos (UFSCar)	801–1000	7	5	6	6	4	1	6	6
Universidade Federal do Paraná—UFPR	801–1000	7	5	6	6	4	1	6	6
Universita' degli Studi di Ferrara	801–1000	7	6	6	6	4	6	6	6
Università degli Studi di Perugia	801–1000	7	5	6	6	4	6	6	6
Università degli studi Roma Tre	801–1000	7	7	6	6	4	6	6	7
Universita' Politecnica delle Marche	801–1000	7	7	6	7	4	6	6	7
Universitas Brawijaya	801–1000	7	6	6	6	4	5	6	6
Universität Duisburg-Essen	801–1000	7	4	6	6	4	1	6	4
Université de Lorraine	801–1000	7	7	6	6	4	3	6	6
Université de Nantes	801–1000	7	7	6	6	4	3	6	6
Université de Rennes 1	801–1000	7	7	6	7	4	3	6	7
Universiti Malaysia Pahang	801–1000	7	7	6	7	4	3	6	7
Universiti Malaysia Perlis	801–1000	7	7	6	7	4	7	6	7
Universiti Pendidikan Sultan Idris (UPSI)	801–1000	7	7	6	7	4	4	6	7
Universiti Tunku Abdul Rahman (UTAR)	801–1000	7	6	6	6	4	5	6	7
University at Albany SUNY	801–1000	7	7	6	6	4	6	6	6
University of Alicante	801–1000	7	7	6	7	4	6	6	7
University of Baghdad	801–1000	7	4	6	6	4	7	6	5
University of Bahrain	801–1000	7	2	6	3	4	3	6	3
University of Bari	801–1000	7	6	6	6	4	6	6	6
University of Brescia	801–1000	7	7	6	7	4	6	6	7
University of Brighton	801–1000	7	2	6	3	4	3	6	3
University of Calcutta	801–1000	7	7	6	6	4	3	6	6
University of Central Florida	801–1000	7	5	6	6	4	1	6	6
University of Central Lancashire	801–1000	7	4	6	3	4	3	6	3
University of Dhaka	801–1000	7	5	6	6	4	5	6	6
University of Dubai	801–1000	7	2	6	3	4	3	6	3
University of East London	801–1000	7	2	6	3	4	3	6	3
University of Engineering & Technology (UET) Lahore	801–1000	7	7	6	7	4	5	6	7
UNIVERSITY OF GDANSK	801–1000	7	7	6	7	4	6	6	7
University of Greenwich	801–1000	7	2	6	3	4	3	6	3
University of Hartford	801–1000	7	7	6	7	5	4	6	7
University of Hertfordshire	801–1000	7	2	6	3	5	3	6	3
University of Hohenheim	801–1000	7	7	6	7	5	3	6	7
University of Hradec Kralove	801–1000	7	7	6	7	5	4	6	7
University of Kwazulu-Natal	801–1000	7	4	6	6	5	1	6	6
University of Lincoln	801–1000	7	2	6	3	5	3	6	4
University of Lodz	801–1000	7	7	6	6	5	6	6	5
University of Louisville	801–1000	7	4	6	6	5	1	6	4
University of Malta	801–1000	7	4	6	7	5	1	6	5
University of Maribor	801–1000	7	5	6	6	5	1	6	5
"University of Maryland, Baltimore County"	801–1000	7	4	6	6	5	1	6	4
University of Messina (UniME)	801–1000	7	5	6	6	5	6	6	6
University of Mississippi	801–1000	7	5	6	6	5	7	6	5
University of Modena and Reggio Emilia	801–1000	7	5	6	6	5	6	6	6
University of Murcia	801–1000	7	4	6	6	5	1	6	6
University of New England Australia	801–1000	7	7	6	7	5	6	6	7
University of New Hampshire	801–1000	7	7	6	6	5	6	6	6
University of Parma	801–1000	7	6	6	6	5	6	6	6
University of Patras	801–1000	7	6	6	6	5	1	6	6
University of Salford	801–1000	7	7	6	3	5	3	6	4
University of Santo Tomas	801–1000	7	4	6	6	5	1	6	4
University of Seoul	801–1000	7	7	6	7	5	7	6	7
University of the Punjab	801–1000	7	7	6	6	5	5	6	7
University of the West of England	801–1000	7	4	6	3	5	3	6	3
University of Tulsa	801–1000	7	7	6	7	5	6	6	7
University of Tyumen	801–1000	7	7	6	7	5	4	6	7
University of Wroclaw	801–1000	7	7	6	6	5	4	6	5
University of Wyoming	801–1000	7	7	6	7	5	6	6	7
University of Zagreb	801–1000	7	5	6	6	5	1	6	6
University of Žilina	801–1000	7	7	6	7	5	7	6	7
Verona University	801–1000	7	6	6	6	5	6	6	7
Viet Nam National University Ho Chi Minh City (VNU-HCM)	801–1000	7	7	6	6	5	5	7	7
"Vietnam National University, Hanoi"	801–1000	7	7	6	7	5	5	7	7
Vytautas Magnus University	801–1000	7	7	6	7	5	4	7	7

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
Worcester Polytechnic Institute	801–1000	7	4	6	7	5	3	7	7
Wroclaw University of Science and Technology (WRUST)	801–1000	7	7	6	7	5	4	7	7
Yamaguchi University	801–1000	7	4	6	5	5	7	7	7
Yerevan State University	801–1000	7	7	6	6	5	7	7	5
Yeungnam University	801–1000	7	4	6	6	5	1	7	4
Yokohama National University	801–1000	7	7	6	7	5	3	7	7
Al Quds University The Arab University in Jerusalem	1001–1200	7	4	6	7	5	1	7	7
Alexandria University	1001–1200	7	6	6	6	5	1	7	6
Aligarh Muslim University	1001–1200	7	7	6	6	5	7	7	6
Amity University	1001–1200	7	7	6	7	5	3	7	7
Amrita Vishwa Vidyapeetham	1001–1200	7	4	6	6	5	1	7	7
Ankara Üniversitesi	1001–1200	7	6	6	6	5	1	7	6
An-Najah National University	1001–1200	7	4	6	6	5	1	7	4
Asia University Taiwan	1001–1200	7	7	6	7	5	6	7	7
Assiut University	1001–1200	7	5	6	6	5	1	7	6
Athens University of Economics and Business	1001–1200	7	7	6	7	5	2	7	7
Auburn University	1001–1200	7	7	6	6	5	6	7	6
Azerbaijan State University of Economics	1001–1200	7	7	6	7	5	7	7	7
Babes-Bolyai University	1001–1200	7	7	6	6	5	4	7	6
Baku State University	1001–1200	7	7	6	7	5	7	7	7
Banaras Hindu University	1001–1200	7	6	6	6	5	1	7	6
Baylor University	1001–1200	7	7	6	6	5	7	7	6
Belarusian State University of Informatics and Radioelectronics	1001–1200	7	7	6	7	5	4	7	7
Benemérita Universidad Autónoma de Puebla	1001–1200	7	6	6	6	5	5	7	6
Bielefeld University	1001–1200	7	7	6	6	5	3	7	6
Bina Nusantara University (BINUS)	1001–1200	7	7	6	7	5	4	7	7
Binghamton University SUNY	1001–1200	7	7	6	6	5	6	7	6
"Birla Institute of Technology and Science, Pilani"	1001–1200	7	7	6	6	5	3	7	6
Birmingham City University	1001–1200	7	4	6	3	5	3	7	3
BRAC University	1001–1200	7	7	6	7	5	5	7	7
Brigham Young University	1001–1200	7	7	6	6	5	6	7	6
Brock University	1001–1200	7	7	6	6	5	3	7	6
Canterbury Christ Church University	1001–1200	7	7	6	7	5	3	7	6
CEU Universities	1001–1200	7	7	6	6	5	4	7	7
Chungbuk National University	1001–1200	7	5	6	6	5	7	7	5
COMSATS University Islamabad	1001–1200	7	7	6	6	5	5	7	7
Corvinus University of Budapest	1001–1200	7	7	6	7	5	4	7	7
CUNY The City College of New York	1001–1200	7	6	6	6	5	6	7	7
Doshisha University	1001–1200	7	7	6	6	5	4	7	6
Escuela Politécnica Nacional	1001–1200	7	7	6	7	5	7	7	7
Escuela Superior Politécnica del Litoral (ESPOL)	1001–1200	7	7	6	7	5	5	7	7
Financial University under the Government of the Russian Federation	1001–1200	7	7	6	7	5	7	7	7
Fordham University	1001–1200	7	7	6	6	5	6	7	6
Future University in Egypt	1001–1200	7	7	7	7	5	4	7	7
Gazi Üniversitesi	1001–1200	7	6	7	6	5	5	7	6
George Mason University	1001–1200	7	7	7	6	5	6	7	6
Glasgow Caledonian University	1001–1200	7	7	7	7	5	3	7	4
Harper Adams University	1001–1200	7	7	7	7	5	3	7	7
Huazhong Agricultural University	1001–1200	7	7	7	6	5	6	7	6
Imam Mohammad Ibn Saud Islamic University—IMSIU	1001–1200	7	7	7	7	5	3	7	6
Istanbul Aydin University	1001–1200	7	7	7	7	5	3	7	4
Ivan Franko National University of Lviv	1001–1200	7	7	7	6	5	7	7	5
Jeju National University	1001–1200	7	6	7	6	5	7	7	7
Kangwon National University	1001–1200	7	6	7	6	5	7	7	7
Kazakh Ablai Khan University of International Relations and World Languages	1001–1200	7	7	7	7	5	7	7	7
Kazan National Research Technological University	1001–1200	7	7	7	7	5	4	7	7
Kent State University	1001–1200	7	7	7	6	5	3	7	6
Kharkiv National University of Radio Electronics	1001–1200	7	7	7	7	5	4	7	7
Kookmin University	1001–1200	7	7	7	7	5	4	7	5
Kuwait University	1001–1200	7	5	7	6	5	1	7	4
Kyoto Institute of Technology	1001–1200	7	7	7	7	5	6	7	7
Kyushu Institute of Technology	1001–1200	7	7	7	7	5	6	7	7
Leeds Beckett University	1001–1200	7	7	7	7	5	3	7	4
Marquette University	1001–1200	7	7	7	7	6	7	7	7
Mendeleev University of Chemical Technology	1001–1200	7	7	7	7	6	7	7	7
Mississippi State University	1001–1200	7	7	7	6	6	6	7	6

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
Multimedia University (MMU)	1001–1200	7	7	7	7	6	4	7	7
Mustansiriyah University	1001–1200	7	4	7	6	6	1	7	5
Mutah University	1001–1200	7	6	7	7	6	1	7	4
Mykolas Romeris University	1001–1200	7	7	7	7	6	4	7	7
Nagoya Institute of Technology (NIT)	1001–1200	7	7	7	7	6	6	7	7
National Taiwan Ocean University	1001–1200	7	7	7	7	6	6	7	7
National University of Kyiv-Mohyla Academy (NaUKMA)	1001–1200	7	7	7	7	6	7	7	7
North South University	1001–1200	7	7	7	7	6	5	7	7
North-West University	1001–1200	7	7	7	6	6	6	7	7
Ocean University of China	1001–1200	7	6	7	6	6	6	7	7
Odessa I.I. Mechnikov National University	1001–1200	7	7	7	7	6	7	7	7
Ohio University	1001–1200	7	6	7	6	6	1	7	6
Paul Valéry University Montpellier	1001–1200	7	7	7	7	6	4	7	7
Rochester Institute of Technology (RIT)	1001–1200	7	7	7	6	6	6	7	6
Saitama University	1001–1200	7	7	7	7	6	6	7	7
San Diego State University	1001–1200	7	7	7	6	6	6	7	6
Sathyabama Institute of Science and Technology (deemed to be university)	1001–1200	7	7	7	7	6	7	7	7
Seattle University	1001–1200	7	7	7	7	6	4	7	7
Seoul National University of Science and Technology	1001–1200	7	7	7	7	6	6	7	7
Shahid Beheshti University (SBU)	1001–1200	7	7	7	7	6	6	7	7
Shanghai International Studies University	1001–1200	7	7	7	7	6	4	7	7
Sheffield Hallam University	1001–1200	7	7	7	7	6	3	7	4
"Siberian Federal University, SibFU"	1001–1200	7	7	7	7	6	3	7	3
Siksha 'O' Anusandhan (Deemed to be University)	1001–1200	7	7	7	7	6	7	7	7
Silesian University of Technology	1001–1200	7	7	7	7	6	7	7	7
Sookmyung Women's University	1001–1200	7	7	7	7	6	7	7	7
Taibah University	1001–1200	7	2	7	3	6	1	7	3
Tallinn University	1001–1200	7	7	7	7	6	3	7	3
Telkom University	1001–1200	7	7	7	7	6	5	7	7
Texas Tech University	1001–1200	7	5	7	6	6	1	7	6
Thapar Institute of Engineering & Technology	1001–1200	7	7	7	7	6	6	7	7
The Herzen State Pedagogical University of Russia	1001–1200	7	7	7	7	6	4	7	7
"The National Research University "Belgorod State University""	1001–1200	7	7	7	7	6	4	7	7
The University of Alabama	1001–1200	7	7	7	6	6	5	7	6
The University of Lahore	1001–1200	7	7	7	7	6	5	7	7
The University of Northampton	1001–1200	7	7	7	3	6	3	7	3
Tokai University	1001–1200	7	6	7	6	6	5	7	7
Tomas Bata University in Zlin	1001–1200	7	7	7	7	6	3	7	7
Ton Duc Thang University	1001–1200	7	7	7	7	6	3	7	7
Universidad Andrés Bello	1001–1200	7	6	7	6	6	5	7	7
Universidad Austral de Chile	1001–1200	7	5	7	6	6	5	7	6
Universidad Autónoma de Nuevo León	1001–1200	7	6	7	6	6	5	7	6
Universidad de Castilla-La Mancha	1001–1200	7	6	7	6	6	6	7	7
Universidad de Lima	1001–1200	7	7	7	7	6	5	7	7
Universidad de Monterrey (UDEM)	1001–1200	7	7	7	7	6	5	7	7
Universidad de Talca	1001–1200	7	7	7	7	6	5	7	7
Universidad de Valparaíso (UV)	1001–1200	7	6	7	6	6	5	7	7
Universidad del Norte	1001–1200	7	5	7	6	6	5	7	6
Universidad del Pacífico	1001–1200	7	7	7	7	6	5	7	7
Universidad Industrial de Santander—UIS	1001–1200	7	6	7	6	6	5	7	6
Universidad Nacional Agraria la Molina	1001–1200	7	7	7	7	6	7	7	7
Universidad Nacional de Cuyo	1001–1200	7	5	7	6	6	1	7	6
Universidad Nacional de la Asunción	1001–1200	7	5	7	6	6	1	7	6
"Universidad Nacional, Costa Rica"	1001–1200	7	7	7	7	6	5	7	7
Universidad Peruana de Ciencias Aplicadas	1001–1200	7	7	7	6	6	5	7	7
Universidad Rey Juan Carlos	1001–1200	7	7	7	6	6	3	7	7
Universidad Técnica Federico Santa María (USM)	1001–1200	7	7	7	7	6	5	7	7
Universidad Tecnológica de Panamá (UTP)	1001–1200	7	7	7	7	6	4	7	7
Universidade da Coruña	1001–1200	7	7	7	7	6	7	7	7
Universidade de Vigo	1001–1200	7	7	7	7	6	6	7	7
Universidade do Estado do Rio de Janeiro (UERJ)	1001–1200	7	6	7	6	6	5	7	6
Universidade Federal de Pernambuco (UFPE)	1001–1200	7	6	7	6	6	5	7	6
Università degli Studi della Tuscia (University of Tuscia)	1001–1200	7	7	7	7	6	6	7	7
Università degli Studi di Udine	1001–1200	7	7	7	7	6	6	7	7
Universitas Hasanuddin	1001–1200	7	6	7	6	6	5	7	6
Universitas Sebelas Maret	1001–1200	7	6	7	6	6	5	7	7
Universität Siegen	1001–1200	7	7	7	6	6	3	7	6

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
Université de Toulouse II-Le Mirail	1001–1200	7	7	7	6	6	4	7	6
Université Lumière Lyon 2	1001–1200	7	7	7	7	6	4	7	7
Université Toulouse 1 Capitole	1001–1200	7	7	7	7	6	4	7	4
Universiti Kuala Lumpur (UniKL)	1001–1200	7	5	7	6	6	7	7	7
Universiti Malaysia Sabah (UMS)	1001–1200	7	6	7	6	6	1	7	7
Universiti Malaysia Sarawak (UNIMAS)	1001–1200	7	4	7	6	6	1	7	7
Universiti Malaysia Terengganu (UMT)	1001–1200	7	7	7	7	6	6	7	7
Universiti Tun Hussein Onn University of Malaysia (UTHM)	1001–1200	7	7	7	7	6	6	7	7
"University of Agriculture, Faisalabad"	1001–1200	7	7	7	6	6	3	7	6
University of Arkansas Fayetteville	1001–1200	7	7	7	7	6	6	7	7
University of Belgrade	1001–1200	7	6	7	6	6	1	7	6
University of Bucharest	1001–1200	7	7	7	6	6	5	7	6
University of Calabria	1001–1200	7	7	7	6	6	6	7	6
University of Derby	1001–1200	7	7	7	7	6	3	7	4
University of Kufa	1001–1200	7	5	7	6	6	7	7	5
University of Latvia	1001–1200	7	5	7	6	6	1	7	4
University of Miskolc	1001–1200	7	7	7	7	6	7	7	7
University of Missouri Saint Louis	1001–1200	7	7	7	7	6	6	7	7
"University of Missouri, Kansas City"	1001–1200	7	7	7	7	6	6	7	7
University of Montana Missoula	1001–1200	7	7	7	7	6	6	7	7
University of Mumbai	1001–1200	7	6	7	6	6	1	7	6
University of Naples Parthenope	1001–1200	7	7	7	7	6	6	7	7
University of North Texas	1001–1200	7	6	7	6	6	6	7	6
University of Ostrava	1001–1200	7	7	7	7	6	4	7	7
University of Palermo	1001–1200	7	7	7	6	6	6	7	6
University of Pardubice	1001–1200	7	7	7	7	6	6	7	7
University of Peradeniya	1001–1200	7	7	7	7	6	7	7	7
University of Primorska	1001–1200	7	7	7	7	6	3	7	4
University of Regina	1001–1200	7	7	7	7	6	3	7	7
University of Rhode Island	1001–1200	7	7	7	6	6	6	7	6
University of Rijeka	1001–1200	7	7	7	7	6	7	7	7
University of Salerno	1001–1200	7	6	7	6	6	6	7	6
University of San Diego	1001–1200	7	7	7	7	6	7	7	7
University of San Francisco	1001–1200	7	7	7	7	6	4	7	7
University of Texas at San Antonio	1001–1200	7	7	7	7	6	6	7	7
University of the Pacific	1001–1200	7	7	7	7	6	7	7	7
University of the Sunshine Coast	1001–1200	7	7	7	7	6	3	7	7
University of the Western Cape	1001–1200	7	7	7	6	6	3	7	6
University of Warmia and Mazury in Olsztyn	1001–1200	7	7	7	7	6	7	7	7
University of Wisconsin Milwaukee	1001–1200	7	7	7	7	6	6	7	7
University of Wolverhampton	1001–1200	7	4	7	3	6	3	7	4
Vellore Institute of Technology (VIT)	1001–1200	7	7	7	7	6	3	7	7
Voronezh State University	1001–1200	7	7	7	6	6	4	7	7
Warsaw University of Life Sciences-SGGW (WULS-SGGW)	1001–1200	7	7	7	7	6	6	7	7
West Virginia University	1001–1200	7	5	7	6	6	6	7	6
Western Michigan University	1001–1200	7	4	7	6	6	1	7	4
Xi'an Jiaotong Liverpool University	1001–1200	7	2	7	3	6	3	7	3
Yildiz Technical University	1001–1200	7	7	7	6	6	4	7	6
Don State Technical University	1201–1400	7	7	7	6	6	4	7	6
Akdeniz Üniversitesi	1201–1400	7	7	7	6	6	7	7	7
Al-Azhar University	1201–1400	7	7	7	6	6	6	7	6
Al-Balqa Applied University	1201–1400	7	7	7	6	6	7	7	7
Alexandru Ioan Cuza University	1201–1400	7	7	7	7	6	6	7	7
Anadolu University	1201–1400	7	7	7	7	6	7	7	7
Aoyama Gakuin University	1201–1400	7	7	7	6	6	5	7	6
Birzeit university	1201–1400	7	7	7	7	6	4	7	7
British University in Egypt	1201–1400	7	7	7	7	6	7	7	7
California State University—Los Angeles	1201–1400	7	7	7	6	6	7	7	6
Católica de Córdoba	1201–1400	7	6	7	6	7	7	7	7
Central Michigan University	1201–1400	7	6	7	6	7	7	7	6
China University of Political Science and Law	1201–1400	7	7	7	7	7	5	7	7
Chung Yuan Christian University	1201–1400	7	7	7	7	7	6	7	7
Cleveland State University	1201–1400	7	7	7	6	7	6	7	6
Dokuz Eylül Üniversitesi	1201–1400	7	7	7	6	7	7	7	7
EGE UNIVERSITY	1201–1400	7	6	7	6	7	7	7	7
Feng Chia University	1201–1400	7	7	7	7	7	6	7	7

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
Florida Atlantic University—Boca Raton	1201–1400	7	6	7	6	7	7	7	6
Fu Jen Catholic University	1201–1400	7	6	7	6	7	1	7	6
Fundación Universidad De Bogotá-Jorge Tadeo Lozano	1201–1400	7	7	7	7	7	7	7	7
Gebze Yüksek Teknoloji Enstitüsü (GYTE)	1201–1400	7	7	7	7	7	7	7	7
German University in Cairo	1201–1400	7	7	7	7	7	5	7	7
Hanoi University of Science and Technology	1201–1400	7	7	7	7	7	5	7	6
Helwan University	1201–1400	7	7	7	6	7	7	7	7
Hongik University	1201–1400	7	7	7	7	7	4	7	7
Humboldt State University	1201–1400	7	7	7	7	7	7	7	7
Illinois State University	1201–1400	7	7	7	7	7	7	7	7
Indiana State University	1201–1400	7	7	7	7	7	7	7	7
International Islamic University Islamabad (IIU)	1201–1400	7	7	7	7	7	7	7	7
Irkutsk State University	1201–1400	7	7	7	7	7	7	7	7
Istanbul Bilgi Üniversitesi	1201–1400	7	7	7	7	7	4	7	7
Izmir Institute of Technology (IZTECH)	1201–1400	7	7	7	7	7	7	7	7
Kindai University (Kinki University)	1201–1400	7	6	7	6	7	5	7	6
King Mongkut\'s Institute of Technology Ladkrabang	1201–1400	7	7	7	7	7	5	7	7
Kwansei Gakuin University	1201–1400	7	7	7	6	7	3	7	6
Lucian Blaga University of Sibiu	1201–1400	7	7	7	6	7	7	7	7
Makerere University	1201–1400	7	6	7	6	7	1	7	6
Mansoura University	1201–1400	7	6	7	6	7	5	7	6
Marmara University	1201–1400	7	7	7	6	7	7	7	6
Meiji University	1201–1400	7	7	7	6	7	4	7	6
Miami University	1201–1400	7	7	7	6	7	6	7	6
MIREA—Russian Technological University	1201–1400	7	7	7	7	7	7	7	7
Moscow City University	1201–1400	7	7	7	7	7	7	7	7
Moscow Pedagogical State University	1201–1400	7	7	7	7	7	4	7	7
National Dong Hwa University	1201–1400	7	7	7	7	7	6	7	7
National Research University Moscow Power Engineering Institute (MPEI)	1201–1400	7	7	7	7	7	4	7	7
National Taipei University	1201–1400	7	7	7	7	7	7	7	7
National University of Life and Environmental Sciences of Ukraine	1201–1400	7	7	7	7	7	7	7	7
Northern Arizona University	1201–1400	7	7	7	6	7	6	7	6
Nova Southeastern University	1201–1400	7	7	7	6	7	7	7	6
Óbuda University	1201–1400	7	7	7	7	7	6	7	7
Pontificia Universidad Catolica Madre y Maestra	1201–1400	7	7	7	7	7	4	7	7
Pontificia Universidade Católica do Campinas—PUC Campinas	1201–1400	7	7	7	7	7	7	7	7
Pontifícia Universidade Católica do Paraná	1201–1400	7	7	7	6	7	7	7	7
Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS)	1201–1400	7	6	7	6	7	7	7	6
Portland State University	1201–1400	7	7	7	6	7	6	7	6
Pukyong National University	1201–1400	7	7	7	7	7	6	7	7
Rikkyo University	1201–1400	7	7	7	7	7	4	7	6
Russian State Agrarian University—Moscow Timiryazev Agricultural Academy	1201–1400	7	7	7	7	7	7	7	7
Russian State University for the Humanities	1201–1400	7	7	7	7	7	7	7	7
Saken Seifullin Kazakh Agrotechnical University	1201–1400	7	7	7	7	7	7	7	7
San Francisco State University	1201–1400	7	7	7	6	7	6	7	6
Shanghai University of Finance and Economics	1201–1400	7	7	7	7	7	5	7	7
Shibaura Institute of Technology	1201–1400	7	7	7	7	7	3	7	7
Slovak University of Agriculture in Nitra	1201–1400	7	7	7	7	7	6	7	7
Soochow University (Taiwan)	1201–1400	7	7	7	7	7	7	7	7
Soongsil University	1201–1400	7	7	7	7	7	3	7	7
Southwest University	1201–1400	7	7	7	6	7	6	7	7
SRM INSTITUTE OF SCIENCE AND TECHNOLOGY	1201–1400	7	7	7	6	7	7	7	7
Stefan cel Mare University of Suceava	1201–1400	7	7	7	7	7	4	7	4
Suez Canal University	1201–1400	7	6	7	6	7	7	7	7
Suranaree University of Technology	1201–1400	7	7	7	7	7	6	7	7
Tamkang University	1201–1400	7	7	7	7	7	6	7	7
Tanta University	1201–1400	7	7	7	7	7	7	7	6
Technical University of Cluj-Napoca	1201–1400	7	7	7	7	7	7	7	7
The Hashemite University	1201–1400	7	6	7	6	7	1	7	7
"The University of Notre Dame, Australia"	1201–1400	7	7	7	7	7	7	7	7
The University of Texas at Arlington	1201–1400	7	7	7	6	7	3	7	6
Toraighyrov University	1201–1400	7	7	7	7	7	7	7	7
Transilvania University of Brasov	1201–1400	7	6	7	6	7	7	7	6
Tunghai University	1201–1400	7	7	7	6	7	6	7	6

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
Universidad Autónoma de Baja California	1201–1400	7	7	7	6	7	7	7	6
Universidad Autónoma de Chile	1201–1400	7	7	7	7	7	5	7	7
Universidad Autónoma de Querétaro (UAQ)	1201–1400	7	6	7	6	7	7	7	6
Universidad Autónoma de San Luis de Potosí	1201–1400	7	6	7	6	7	7	7	6
Universidad Autonoma de Yucatan	1201–1400	7	7	7	6	7	7	7	6
Universidad Autónoma del Estado de Morelos (UAEM)	1201–1400	7	6	7	6	7	7	7	6
Universidad Bernardo O'Higgins	1201–1400	7	7	7	7	7	5	7	7
Universidad Católica de Colombia	1201–1400	7	7	7	7	7	7	7	7
Universidad Católica de La Santísima Concepción—UCSC	1201–1400	7	7	7	6	7	7	7	7
Universidad Católica del Norte	1201–1400	7	6	7	6	7	5	7	7
Universidad Central de Chile	1201–1400	7	7	7	7	7	7	7	7
Universidad de Cartagena	1201–1400	7	6	7	6	7	7	7	6
Universidad de Cuenca	1201–1400	7	6	7	6	7	7	7	6
Universidad de Guanajuato	1201–1400	7	7	7	6	7	5	7	6
Universidad de La Frontera (UFRO)	1201–1400	7	7	7	7	7	6	7	7
Universidad de La Salle	1201–1400	7	7	7	7	7	7	7	7
Universidad de La Serena	1201–1400	7	7	7	7	7	7	7	7
Universidad de las Fuerzas Armadas ESPE (Ex-Escuela Politécnica del Ejército)	1201–1400	7	7	7	6	7	7	7	6
Universidad de Medellín	1201–1400	7	7	7	7	7	7	7	7
Universidad de Panama	1201–1400	7	7	7	7	7	5	7	6
Universidad de Piura	1201–1400	7	7	7	7	7	5	7	7
Universidad de Puerto Rico	1201–1400	7	6	7	6	7	5	7	6
Universidad de Sonora	1201–1400	7	7	7	6	7	7	7	6
Universidad del Bío-Bío	1201–1400	7	7	7	6	7	5	7	6
Universidad del Cauca	1201–1400	7	7	7	6	7	4	7	6
Universidad del Desarrollo (UDD)	1201–1400	7	7	7	7	7	5	7	7
Universidad del Magdalena	1201–1400	7	7	7	6	7	7	7	6
Universidad del Salvador	1201–1400	7	7	7	7	7	4	7	7
Universidad del Valle de Mexico (UVM)	1201–1400	7	7	7	7	7	5	7	6
Universidad La Salle (ULSA)	1201–1400	7	6	7	6	7	5	7	7
Universidad Mayor de San Andrés (UMSA)	1201–1400	7	6	7	6	7	5	7	6
Universidad Metropolitana	1201–1400	7	7	7	7	7	5	7	7
Universidad Nacional de Quilmes	1201–1400	7	7	7	7	7	7	7	7
Universidad Nacional de San Martín (UNSAM)	1201–1400	7	7	7	7	7	6	7	7
Universidad Nacional del Litoral	1201–1400	7	7	7	6	7	5	7	6
Universidad Popular Autónoma del Estado de Puebla (UPAEP)	1201–1400	7	7	7	7	7	7	7	7
Universidad San Ignacio de Loyola	1201–1400	7	7	7	7	7	5	7	7
Universidad Tecnica Particular De Loja (UPTL)	1201–1400	7	7	7	7	7	5	7	6
"Universidad Tecnológica de la Habana José Antonio Echeverría, Cujae"	1201–1400	7	7	7	7	7	7	7	7
Universidad Tecnológica de Pereira	1201–1400	7	7	7	6	7	7	7	6
Universidade Estadual de Londrina	1201–1400	7	6	7	6	7	7	7	6
Universidade Federal da Bahia	1201–1400	7	6	7	6	7	5	7	6
Universidade Federal da Paraíba	1201–1400	7	7	7	6	7	7	7	6
Universidade Federal de Goiás	1201–1400	7	7	7	6	7	7	7	6
Universidade Federal de Santa Maria	1201–1400	7	6	7	6	7	7	7	6
Universidade Federal de Uberlândia	1201–1400	7	7	7	6	7	7	7	7
Universidade Federal de Viçosa (UFV)	1201–1400	7	6	7	6	7	7	7	6
Universidade Federal do Ceará (UFC)	1201–1400	7	6	7	6	7	7	7	6
Universidade Federal do Parà—UFPA	1201–1400	7	6	7	6	7	7	7	6
Universidade Federal Fluminense	1201–1400	7	6	7	6	7	5	7	6
Universidade Presbiteriana Mackenzie	1201–1400	7	7	7	6	7	5	7	6
"Universita' degli Studi "G. d'Annunzio" Chieti Pescara"	1201–1400	7	7	7	7	7	6	7	7
Università degli studi di Bergamo	1201–1400	7	7	7	7	7	3	7	7
Universitas Andalas	1201–1400	7	7	7	6	7	7	7	6
Universitas Muhammadiyah Surakarta	1201–1400	7	7	7	7	7	7	7	7
Universitas Sumatera Utara	1201–1400	7	6	7	6	7	7	7	6
Universitatea de Vest din Timisoara/West University of Timisoara	1201–1400	7	7	7	7	7	7	7	7
Université de Caen Normandie	1201–1400	7	6	7	6	7	1	7	6
Université de Tunis El Manar	1201–1400	7	6	7	6	7	5	7	7
Université Jean Moulin Lyon 3	1201–1400	7	7	7	7	7	4	7	7
Université Paris-Nanterre	1201–1400	7	7	7	6	7	5	7	6
University of Babylon	1201–1400	7	6	7	6	7	7	7	7
University of Colombo	1201–1400	7	7	7	6	7	5	7	6
University of Ghana	1201–1400	7	6	7	6	7	5	7	6
University of International Business and Economics	1201–1400	7	7	7	7	7	4	7	7
University of Karachi	1201–1400	7	7	7	6	7	5	7	6

Table A1. *Cont.*

University	Rank	QS	Fuzzy	QS	KM	QS	GMM	QS	AGG
University of Kragujevac	1201–1400	7	7	7	7	7	7	7	7
University of North Carolina at Charlotte	1201–1400	7	7	7	6	7	6	7	6
University of North Carolina at Greensboro	1201–1400	7	7	7	6	7	6	7	6
University of Silesia in Katowice	1201–1400	7	7	7	6	7	7	7	6
University of Split	1201–1400	7	7	7	6	7	7	7	7
University of Texas El Paso	1201–1400	7	7	7	7	7	6	7	7
University POLITEHNICA of Bucharest	1201–1400	7	7	7	7	7	7	7	7
"University Politehnica of Timisoara, UPT"	1201–1400	7	7	7	7	7	7	7	7
VSB—Technical University of Ostrava	1201–1400	7	7	7	7	7	4	7	7
Western Washington University	1201–1400	7	7	7	6	7	5	7	6
Yarmouk University	1201–1400	7	6	7	6	7	1	7	7
Youngsan University	1201–1400	7	7	7	7	7	7	7	7
Yuan Ze University	1201–1400	7	7	7	7	7	6	7	7
Zagazig University	1201–1400	7	7	7	6	7	7	7	7
Ataturk University	1401+	7	7	7	6	7	7	7	6
Cukurova University	1401+	7	7	7	6	7	7	7	7
Damascus University	1401+	7	7	7	6	7	7	7	6
Erciyes Üniversitesi	1401+	7	7	7	6	7	7	7	7
Sakarya University	1401+	7	7	7	6	7	1	7	7
Sudan University of Science and Technology	1401+	7	7	7	6	7	7	7	7
"Universidad Católica Boliviana "San Pablo""	1401+	7	7	7	7	7	7	7	7
Universidad Católica de Santiago de Guayaquil	1401+	7	7	7	7	7	7	7	7
Universidad Tecnológica de Bolívar	1401+	7	7	7	7	7	5	7	7
Université Mohammed V de Rabat	1401+	7	7	7	6	7	7	7	7
University of Oradea	1401+	7	7	7	6	7	1	7	6

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