Interdisciplinary Science Rankings
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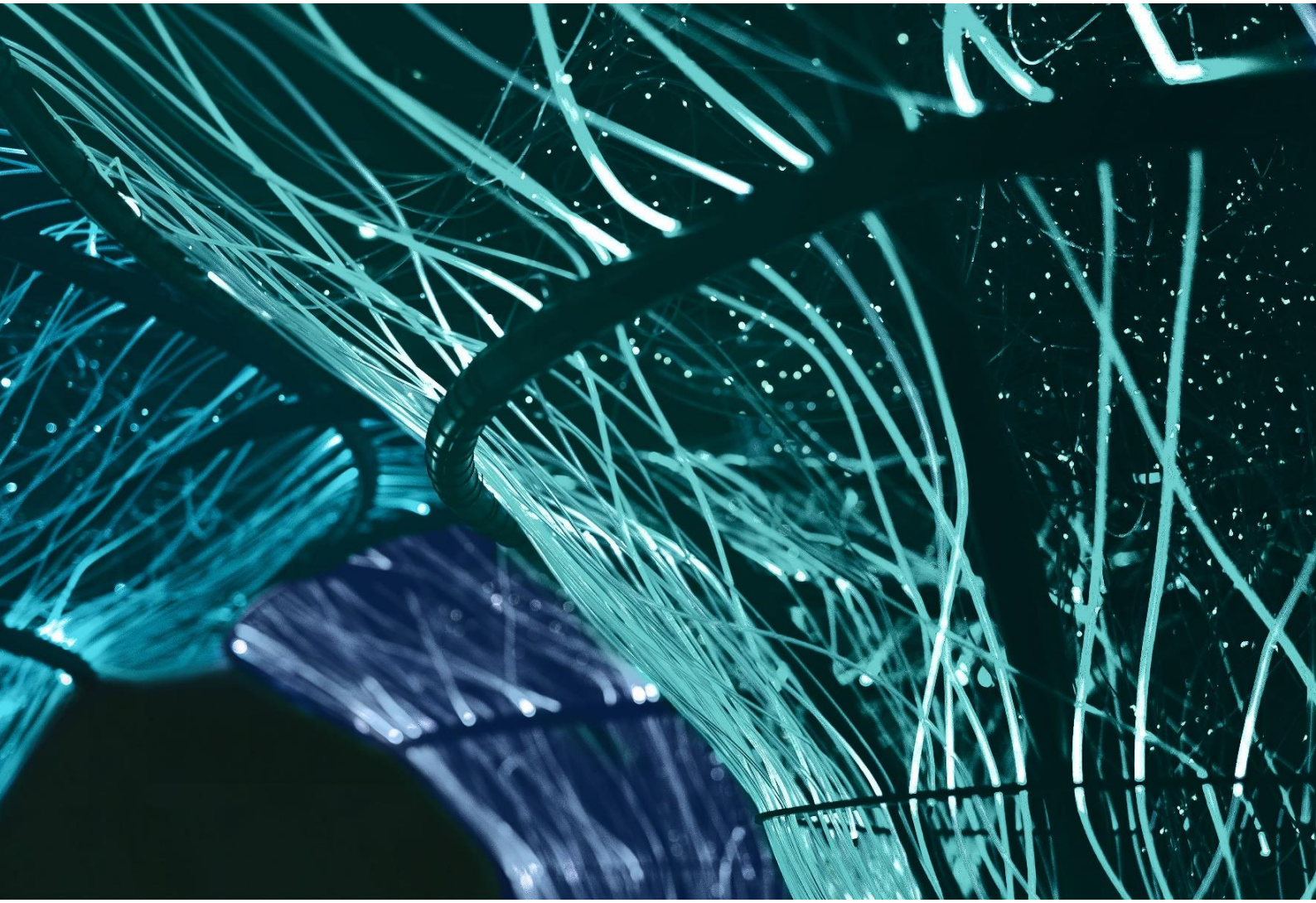
Interdisciplinary Science Rankings (ISR) 2025- Methodology

November 2024



Times Higher Education Interdisciplinary Science Rankings- Purpose

Interdisciplinary Science Research holds the promise of unlocking learnings from multiple academic disciplines to solve global challenges. THE's Interdisciplinary Science Rankings, launched in association with Schmidt Science Fellows, is the first effort of its kind to measure universities' contributions and commitment to Interdisciplinary Science. This methodology describes the initial edition of the Interdisciplinary Science Rankings (ISR 2025), launched in November 2024.

Important links

THE ISR 2025 Final Rankings: http://www.timeshighereducation.com/interdisciplinary-science-rankings (Live from 21 November 2024)

Statement on processing

This document (the "Methodology") sets out our end-to-end process for generating the THE Interdisciplinary Science Rankings 2025 (the "Rankings"). Times Higher Education confirms that we have followed our Methodology and correctly applied the specific procedures denoted by this document.

Signed: 

Print: Duncan Ross

Role: Chief Data Officer, *Times Higher Education*

Date: 04 November 2024

For and on behalf of *THE* World Universities Insights Limited

1) Definition and Scope of Interdisciplinary Science

For the ISR 2025 we are using the following definition of interdisciplinary science.

Interdisciplinary science refers to the integration of both the knowledge, traditions, and processes from multiple scientific disciplines. It can involve multiple academics who collaborate with one another across different disciplines. It may also be a single academic approaching a scientific question across multiple disciplines.

In the ISR 2025, only science disciplines are covered. If a research project involves two or more science disciplines, then it is considered as Interdisciplinary Science.

However, if it involves only one science discipline then it is not considered Interdisciplinary Science Research even if it also involves one or more non-science disciplines. If research included two topics that fall under only one of the four applicable subjects mentioned above, but they belong to two different subjects in the THE's more detailed 31-subject breakdown, it is also considered interdisciplinary.

Of note, due to feedback from universities who participated in roundtables and stakeholder conversations with THE, from the ISR 2026 and onward any research project including multiple scientific disciplines, or one or more scientific disciplines combined with one or more social science disciplines will be considered.

2) Methodology Overview

The ISR methodology consists of three pillars, each representing a stage in the lifecycle of research projects. Each pillar is further divided into metrics to measure different aspects of that stage.

- Inputs
- Process
- Outputs

Inputs Pillar

Metric name	**Interdisciplinary Science Research funding**
Description	The proportion of research income in science subjects devoted to Interdisciplinary Science Research
Calculation	Interdisciplinary Science Research income / total science research income
Data source	Portal quantitative
Scoring algorithm	Normal CDF
Weight	8%

Metric name	**Industry funding**
Description	Amount of industry funding, normalised by the staff numbers
Calculation	Total science industry income / (total science academic staff number + total science research staff number)
Data source	Portal quantitative
Scoring algorithm	Exponential CDF
Weight	11%

Process Pillar

Metric name	**Measure of success**
Description	Does your university have measures of interdisciplinary success?
Calculation	• 1 point for a positive answer • 1 point for a publicly accessible piece of evidence if the answer is positive • 0.5 points if the evidence is generic, 1 point if the evidence is specific
Data source	Portal evidence
Scoring algorithm	Scaled from 0-3 points linearly to 0-100 points
Weight	4%

Metric name	**Physical facilities**
Description	Does your university provide specific physical facilities for interdisciplinary teams?
Calculation	• 1 point for a positive answer • 1 point for a publicly accessible piece of evidence if the answer is positive • 0.5 point if the evidence is generic, 1 point if the evidence is specific
Data source	Portal evidence
Scoring algorithm	Scaled from 0-3 points linearly to 0-100 points
Weight	4%

Metric name	**Admin support**
Description	Does your university provide specific administrative support for interdisciplinary teams?
Calculation	• 1 point for a positive answer • 1 point for a publicly accessible piece of evidence if the answer is positive • 0.5 point if the evidence is generic, 1 point if the evidence is specific
Data source	Portal evidence
Scoring algorithm	Scaled from 0-3 points linearly to 0-100 points
Weight	4%

Metric name	**Promotion**
Description	Does your university have a tenure or a promotion system in place that recognizes interdisciplinary research?
Calculation	• 1 point for a positive answer • 1 point for a publicly accessible piece of evidence if the answer is positive • 0.5 points if the evidence is generic, 1 point if the evidence is specific
Data source	Portal evidence
Scoring algorithm	Scaled from 0-3 points linearly to 0-100 points
Weight	4%

Outputs Pillar

Metric name	**Number of Interdisciplinary Science Research publications**
Description	Number of Interdisciplinary Science Research publications normalised by staff number
Calculation	Number of Interdisciplinary Science Research publications / sqrt (total science academic staff + total science research staff)
Data source	Bibliometric, Portal quantitative
Scoring algorithm	Exponential CDF
Weight	10%

Metric name	**Proportion of Interdisciplinary Science Research publications**
Description	Number of Interdisciplinary Science Research publications normalised by total science publications
Calculation	Number of Interdisciplinary Science Research publications / Number of science publications
Data source	Bibliometric
Scoring algorithm	Normal CDF
Weight	5%

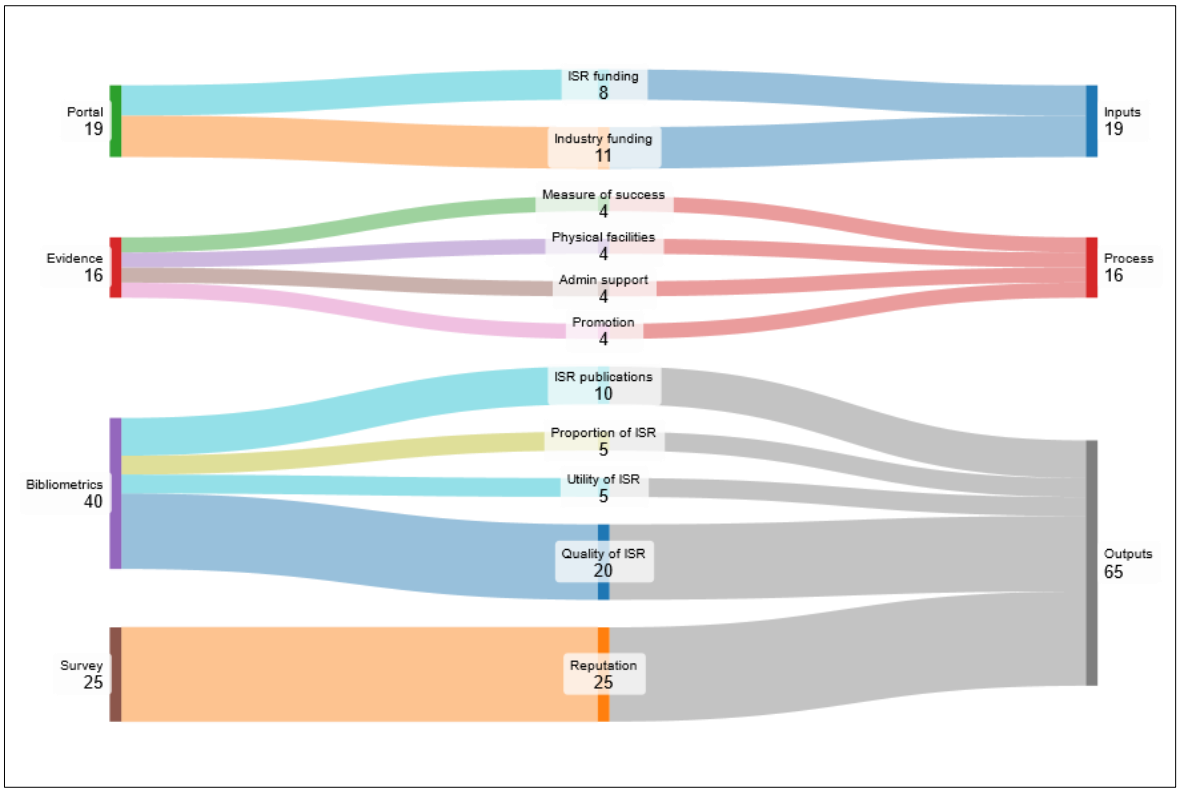
Metric name	**Utility of Interdisciplinary Science Research**
Description	Out of discipline citation
Calculation	75th percentile cscore of science publications. See Appendix C for explanation of cscore calculation
Data source	Bibliometric
Scoring algorithm	Normal CDF
Weight	5%

Metric name	**Quality of Interdisciplinary Science Research**
Description	Quality of Interdisciplinary Science Research publications, as measured by the 75th percentile FWCI
Calculation	75th percentile FWCI
Data source	Bibliometric
Scoring algorithm	Normal CDF
Weight	20%

Metric name	**Reputation**
Description	Reputation of support for interdisciplinary teams
Calculation	Number of votes
Data source	Survey
Scoring algorithm	Exponential CDF
Weight	25%

With the exception of Reputation, all metrics that are scored with Normal CDF and Exponential CDF use a truncated dataset (i.e., the highest 2.5% and the lowest 2.5% of data points are discarded) when learning the scoring parameters. The purpose of this truncation is to avoid extreme data points compressing other data points into a narrow score range. The scoring parameters of Reputation are learned using the full dataset.

Reputation is scored with Exponential CDF using the full dataset. This is because using a truncated dataset would give too many institutions full marks in this metric and thus reducing its ability to differentiate amongst the best institutions.



3) Data Sources

Portal

The first data set used is data collected directly from universities and institutions using our data collection system. This data is submitted by approved and authorised representatives of the institution and is validated by THE.

Portal data for the ISR was collected at the same time as the data for the World University Rankings 2025. Universities were asked to submit data from either the financial year, calendar year, or academic year that ended in 2022.

The data collected can be classified into two groups: quantitative data and evidence data.

Relevant Disciplines

For the ISR 2025, only data from science subjects, namely those that fit within the THE high-level subjects of Computer Science, Engineering, Life Sciences and Physical Sciences, were requested during data collection in the Portal.

Applicable subjects
Computer Science
Engineering
Life Sciences
Physical Sciences

If research includes two topics that fall under **only one** of the four applicable subjects mentioned above, but they belong to two different subjects in the THE's more detailed 31-subject breakdown, it is also considered interdisciplinary. Please see Appendix A for a full list of applicable subjects based on our Detailed Subject Mapping.

Quantitative data

Two pieces of quantitative information specific to IS Research were obtained from the Portal data

- Amount of IS Research funding
- Number of job ads that specifically mentioned interdisciplinary science

The number of job adverts was a candidate metric for the rankings but was not chosen for the final ranking after data validation.

In addition, the following quantitative data, which were collected in the parallel World University Rankings 2025 data collection, were also used in the compilation of the ISR 2025:

- Academic staff numbers
- Research staff numbers
- Research income
- Industry income

Evidence Data

Institutions were also asked to answer the following questions. For each question, they were asked if they implement policies in each of these areas. If yes, they were then asked to submit evidence in the form of a URL link. The evidence was evaluated for relevance by THE.

- Does your university provide measures of interdisciplinary research success amongst science disciplines?
- Does your university provide specific physical facilities for interdisciplinary science research amongst science disciplines?
- Does your university provide specific administrative support for interdisciplinary science research teams amongst science disciplines?
- Does your university have a promotion or tenure system in place that recognizes interdisciplinary research amongst science disciplines?

Evidence Scoring Criteria

Evidence is assessed according to a simple calculation approach. Where a metric requires evidence, a series of questions are asked, and points are assigned according to the answer. We consider whether the answer is positive, if evidence is provided and is relevant to the question, and whether it is publicly available. This process is detailed in the methodology for each metric.

- Statement: Does the university explicitly declare that it meets the criteria?
    - Answer to the question yes: 1 point
    - Answer is no: 0 points

- Supporting evidence: Has a URL link been shared as evidence and does it answer the question?
    - Answer is 'Yes', and the evidence fully answers the question: +1 point
    - Answer is 'Yes', and the evidence partially answers the question: +0.5 points
    - No evidence / the evidence does not answer the question: 0 points

- Publication: Is the evidence provided publicly available?
    - Yes: +1 point
    - No: 0 points

Bibliometric data- Elsevier

This year, our bibliometric data supplier Elsevier provided us for examination more than 157 million citations to 18 million journal articles, conference proceedings, books and book chapters published over five years. The data include over 30,000 active peer-reviewed journals indexed by Elsevier's Scopus database and all indexed publications between 2019 and 2023. Citations to these publications made from 2019 to 2024 are also collected.

Together, these two data sets allow us to determine the number of science publications from each institution and their quality as measured by Field Weighted Citation Impact.
In addition, for the evaluation of interdisciplinarity, Elsevier has also provided a set of information about the subject "subfields" of each publication.

Survey

A survey of active researchers was conducted in 2024. Universities that signed up to participate in the WUR/ISR data collection were asked to distribute the survey to their researchers. The questionnaire targeted scientists working in science disciplines, but it was not exclusively addressed to those engaged in interdisciplinary work.

The respondents were asked to name up to five institutions that are the best globally in terms of Interdisciplinary Science Research. This is referred to as IS Research reputation. The responses were cleansed by screening out responses that are abnormal:

1. Responses that took less than 120 seconds to complete
2. Responses that only consist of scores of 9s and/or 10s
3. Incomplete responses

Since the surveys were only sent to institutions that signed up for the WUR/ISR data collection, there may be a potential geographical bias. In order to ensure that the result of the IS Research reputation is globally representative, two interventions were used.

- Self-votes were discarded
- The remaining votes are country-weighted against a benchmark. The benchmark chosen is the number of unique science authors in each country in who published in 2019-2022 according to open-source data extracted on 30th June 2024. This is based on the declared country of the survey respondents.

The survey also contained questions about a respondent's own university including questions on the level of support and encouragement they experience in their own institution. These answers were

not used in the compilation of the rankings.

Supplemental Data

- Purchasing power parity (PPP) rates
- Currency exchange rates

These two were sourced from the World Bank and HMRC respectively. Data from the year 2022 were used in the ranking calculation.

4) Inclusion Criteria

In order for an institution to be ranked in the Interdisciplinary Science Rankings, it must satisfy all of the following criteria:

- Must submit data for the World University Rankings 2025.
- Must declare at least one science subject (Computer Science, Engineering, Life Sciences and Physical Sciences) as applicable.
- Must publish at least 100 Interdisciplinary Science Research academic publications within the five-year window 2019 to 2023.
- Must have at least 50 academic and research staff in total across the applicable science subjects. These staff members do not necessarily need to be engaged in interdisciplinary research.
- Must not have more than two missing metrics, once the metrics have been calculated for the rankings.
- Must not be in THE's custom exclusion list - THE reserves the right to exclude any institution from our rankings, even if they satisfy all other inclusion criteria.

Universities that submitted data but did not meet the eligibility criteria for our table are included as reporter institutions. This means that they are listed, alphabetically, at the end of the rankings table, and rather than being assigned a rank number, they are instead labelled 'reporter' institutions.

5) Publication and reporting

Final rankings preparation

All institutions were ranked overall and are published in the final rankings table on the THE website. On the website, the overall score and inputs, process and outputs pillar scores are displayed.

Precise overall scores are shown for the institutions ranked in the top 200 overall. Banded overall scores are presented for the institutions ranked in bands (e.g., from 201 to 250). Precise individual pillar scores are displayed for each ranked institution.

For the institutions ranked 1 – 200 overall, an individual rank position is listed. The next institutions are assigned to the following bands: 201-250, 251-300, 301-350, 351-400, 401-500, 501-600, 601+.

Institutions with the 'Reporter' status are listed alphabetically at the end of the rankings table, and rather than being assigned a rank number, they are instead labelled reporter institutions.

Review and sign off

The Rankings are formally signed off by THE World Universities Insights Limited management prior to being published in print and online. The Rankings results are reviewed and signed off by THE's Chief Data Officer.

Appendix A – List of Applicable Disciplines

Topic	Applicable THE 11 Subject	Applicable THE 31 Subject
Computer and information science	Computer Science	Computer Science: Computer Science
Software Engineering	Computer Science	Computer Science: Computer Science
Information Systems	Computer Science	Computer Science: Computer Science
Telecommunications	Computer Science	Computer Science: Computer Science
Aerospace engineering	Engineering	Engineering: Mechanical and Aerospace Engineering
Automation and control systems	Engineering	Engineering: General Engineering
Biomedical engineering	Engineering	Engineering: General Engineering
Chemical engineering	Engineering	Engineering: Chemical Engineering
Civil engineering	Engineering	Engineering: Civil Engineering
Construction and building technology	Engineering	Engineering: Civil Engineering
Earth and environmental engineering	Engineering	Engineering: Civil Engineering
Electrical and electronic engineering	Engineering	Engineering: Electrical and Electronic Engineering

Energy and fuels	Engineering	Engineering: Civil Engineering
Imaging science and photographic technology	Engineering	Engineering: General Engineering
Industrial engineering	Engineering	Engineering: Mechanical and Aerospace Engineering
Instruments and instrumentation	Engineering	Engineering: General Engineering
Marine engineering	Engineering	Engineering: General Engineering
Materials science	Engineering	Engineering: General Engineering
Mechanical engineering	Engineering	Engineering: Mechanical and Aerospace Engineering
Mechanics	Engineering	Engineering: Mechanical and Aerospace Engineering
Metallurgy and metallurgical engineering	Engineering	Engineering: General Engineering
Mining and mineral processing	Engineering	Engineering: General Engineering
Nuclear science and technology	Engineering	Engineering: Civil Engineering
Robotics	Engineering	Engineering: Electrical and Electronic Engineering
Transportation	Engineering	Engineering: Civil Engineering
Engineering and technology –other topics	Engineering	Engineering: General Engineering
Allergy	Life Sciences	Life sciences: Biological Sciences
Orthopaedics	Life Sciences	Life sciences: Sport Science
Agriculture, fisheries and food	Life Sciences	Life sciences: Agriculture & Forestry
Anatomy and morphology	Life Sciences	Life sciences: Biological Sciences
Biology, biochemistry and biotechnology	Life Sciences	Life sciences: Biological Sciences
Biophysics	Life Sciences	Life sciences: Biological Sciences
Ecology, evolution and environment	Life Sciences	Life sciences: Agriculture & Forestry
Entomology	Life Sciences	Life sciences: Agriculture & Forestry
Forestry	Life Sciences	Life sciences: Agriculture & Forestry
Genetics and heredity	Life Sciences	Life sciences: Biological Sciences
Immunology	Life Sciences	Life sciences: Biological Sciences
Mycology	Life Sciences	Life sciences: Biological Sciences
Parasitology	Life Sciences	Life sciences: Biological Sciences
Physiology	Life Sciences	Life sciences: Biological Sciences
Plant sciences	Life Sciences	Life sciences: Agriculture & Forestry

Sports Science	Life Sciences	Life sciences: Sport Science
Toxicology	Life Sciences	Life sciences: Biological Sciences
Veterinary sciences	Life Sciences	Life sciences: Veterinary Science
Virology	Life Sciences	Life sciences: Veterinary Science
Zoology	Life Sciences	Life sciences: Agriculture & Forestry
Life sciences – other topics	Life Sciences	Life sciences: Biological Sciences
Acoustics	Physical Sciences	Physical sciences: Physics & Astronomy
Operations research and management science	Physical Sciences	Physical sciences: Mathematics & Statistics
Palaeontology	Physical Sciences	Physical sciences: Geology, Environmental, Earth & Marine Sciences
Astronomy and astrophysics	Physical Sciences	Physical sciences: Physics & Astronomy
Chemistry	Physical Sciences	Physical sciences: Chemistry
Crystallography	Physical Sciences	Physical sciences: Chemistry
Earth sciences	Physical Sciences	Physical sciences: Geology, Environmental, Earth & Marine Sciences
Mathematics and statistics	Physical Sciences	Physical sciences: Mathematics & Statistics
Meteorology and atmospheric sciences	Physical Sciences	Physical sciences: Geology, Environmental, Earth & Marine Sciences
Nanotechnology	Physical Sciences	Physical sciences: Chemistry
Physics	Physical Sciences	Physical sciences: Physics & Astronomy
Polymer science	Physical Sciences	Physical sciences: Chemistry
Physical sciences – other topics	Physical Sciences	Physical sciences: Physics & Astronomy
Decision support/statistics	Physical Sciences	Physical sciences: Mathematics & Statistics

Appendix B – Determining the ISR Research score of publications

To measure the interdisciplinarity of a publication, we calculate an ISR Research score. Each publication is first assigned a score vector representing its subject areas (i.e. subject tagging). We focus only on publications related to science, excluding any that lack science content.

Next, we create a matrix for each publication based on its subject scores. By adding together these individual matrices, we generate a combined "adjacency matrix" that captures how different subjects relate across all publications. Using this matrix, we then calculate the distances between subjects, helping us understand how closely they are related.

Finally, the ISR Research score for each publication is determined based on these subject distances, indicating the degree to which a publication spans multiple disciplines. Publications that rank in the top 25% for interdisciplinarity in our dataset are identified as IS Research.

Appendix C – Determining the cross-discipline citation (Cscore)

The Cscore is a measure of how interdisciplinary a publication's citations are. To determine this, we examine the relationship between any two publications where one cites the other. If publication j cites publication i, we calculate the interdisciplinary level of this citation connection by considering the combined subject areas of both publications. This calculation produces a value, known as Cite_ISR, which reflects the interdisciplinarity of that citation.

For each publication, its Cscore is determined by the highest Cite_ISR value it receives from any of its citing publications. In other words, a publication's Cscore represents the most interdisciplinary citation it has received. Finally, to gauge the cross-disciplinary influence of an entire institution, we calculate the 75th percentile Cscore across all science publications associated with that institution. This institutional Cscore gives a sense of the institution's overall interdisciplinary impact through its research citations.

Appendix D – List of science subfields in Scopus

- Acoustics
- Aerospace & Aeronautics
- Agronomy & Agriculture
- Analytical Chemistry
- Anatomy & Morphology
- Applied Mathematics
- Applied Physics
- Artificial Intelligence & Image Processing
- Astronomy & Astrophysics
- Automobile Design & Engineering
- Biochemistry & Molecular Biology
- Bioinformatics
- Biomedical Engineering
- Biophysics
- Biotechnology
- Chemical Engineering
- Chemical Physics
- Civil Engineering
- Computation Theory & Mathematics
- Computer Hardware & Architecture
- Dairy & Animal Science
- Developmental Biology
- Distributed Computing
- Ecology
- Electrical & Electronic Engineering
- Energy
- Entomology

- Environmental Engineering
- Environmental Sciences
- Evolutionary Biology
- Fisheries
- Fluids & Plasmas
- Food Science
- Forestry
- General Chemistry
- General Mathematics
- General Physics
- Genetics & Heredity
- Geochemistry & Geophysics
- Geological & Geomatics Engineering
- Geology
- Horticulture
- Industrial Engineering & Automation
- Information Systems
- Inorganic & Nuclear Chemistry
- Marine Biology & Hydrobiology
- Materials
- Mathematical Physics
- Mechanical Engineering & Transports
- Medical Informatics
- Medicinal & Biomolecular Chemistry
- Meteorology & Atmospheric Sciences
- Microbiology
- Microscopy
- Mining & Metallurgy
- Mycology & Parasitology
- Nanoscience & Nanotechnology
- Networking & Telecommunications
- Nuclear & Particle Physics
- Numerical & Computational Mathematics
- Nutrition & Dietetics
- Oceanography
- Operations Research
- Optics
- Optoelectronics & Photonics
- Organic Chemistry
- Ornithology
- Paleontology
- Physical Chemistry
- Physiology
- Plant Biology & Botany
- Polymers
- Software Engineering

- Statistics & Probability
- Strategic, Defence & Security Studies
- Toxicology
- Veterinary Sciences
- Virology
- Zoology