

# **Research Assessment Indicators and Tools**

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- What is research assessment and why it matters?
- Clarivate Analytics Web of Science:
  - Journal Impact Factor (JIF);
  - Quartile in Category (Q);
  - Aggregate Impact Factor (AIF);
  - Eigenfactor Score & Article Influence Score (AIS);
- Elsevier Scopus:
  - CiteScore, Quartile in Category (Q), SJR, Source-Normalized Impact per Paper (SNIP);
- H-index;
- Altmetrics;
- Qualitative Research Assessment.

# Scientometrics - study of measuring and analyzing science by <u>quantitative</u> methods

- Journal-level metrics (IF, CiteScore, Quartile, ...)
- Article-level metrics (no. of citations, views/downloads, ...)
- Author-level metrics (h-index, no. of publications, no. of citations, collaboration, ...)
- Altmetrics (alternative metrics)

**Bibliometrics** is the application of statistical methods to the study of bibliographic data, especially in scientific and library and information science contexts,

Both fields (scientometrics and bibliometrics) are closely related and largely overlap.



### Why Scientometrics and Research Assessment Indicators Matter?

- Assessing the impact of research results, when applying for a new job, promotion, salary supplement, or research funding;
- Evaluating other researchers for collaborative purposes;
- Choosing a journal for **publishing** research results;
- Selecting high quality scientific information for studies and graduation works;
- Assessing the relevance of literature sources for subscription;
- Bibliometric data are also analyzed in compiling University rankings.



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## **Research Assessment at KTU**

Publication is counted in the institutional research performance, if:

 It is important where your publication is published because journal metrics are used to determine researchers' performance

SOCIAL SCIENCES	NATURAL SCIENCES, TECHNOLOGY, AND MEDICAL AND HEALTH SCIENCES
<ul> <li>Publication in a journal that has:</li> <li>JIF in SSCI and/or SCIE (Web of Science), and/or</li> <li>SNIP in Scopus</li> </ul>	<ul> <li>Publication in a journal that has:</li> <li>JIF in SSCI <u>and/or</u> SCIE <u>and</u></li> <li>JIF/AIF&gt;0.25</li> </ul>

International-level scientific paper in the areas of natural sciences, technology, and medical and health sciences is a paper published in a scientific journal that is in the first, second or third quartile (Q1-Q3) of the relevant

group of journals in the WoS SCIE database.

International-level scientific paper in the areas of humanities and social sciences is a paper published in a scientific journal that is in the first, second or third quartile (Q1-Q3) of the relevant group of journals in the WoS SSCI or Elsevier Scopus database

### Bibliographic Databases: Web of Science (WoS) & Scopus ktu



# Web of Science (WoS) Database Tools



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Useful to now which one to use for each case:

- Web of Science Core Collection

   find publications, authors
- Journal Citation Reports check journals (JIF, Quartile)
- Master Journal List find the right journal
- InCites check metrics, trends, compare institutions, researchers
- Research Horizon Navigator check emerging research topics







### WoS has several indexes for scholarly journals, books, conferences etc.

- Science Citation Index Expanded (SCIE) multidisciplinary index to the journal literature of the sciences (natural science, technology, medical science);
- Social Sciences Citation Index (SSCI) multidisciplinary index to the journal literature of the social sciences;
- Arts & Humanities Citation Index (A&HCI) multidisciplinary index to the journal literature of the arts and humanities. Journals in the ESCI obtained an impact factor (IF) in 2023;
- Emerging Sources Citation Index (ESCI) includes peer-reviewed publications of regional importance and in emerging scientific fields. Journals in the ESCI obtained an impact factor (IF) in 2023;

**Other:** Conference Proceedings (CPCI-S; CPCI-SSH), Book Citation Index (BKCI-S; BKCI-SSH).

JIF

### WoS Edition (Index) in Research Assessment at KTU

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Publication is counted in the performance and competence evaluation, if:

 It is important where your publication is published because journal metrics are used to determine researchers' performance

SOCIAL SCIENCES	NATURAL SCIENCES, TECHNOLOGY, AND MEDICAL AND HEALTH SCIENCES
Publication in a journal that has:	Publication in a journal that has:
JIF in SSCI and/or SCIE (WoS), and/or	<ul> <li>JIF in SSCI and/or SCIE and</li> <li>JIF/AIF&gt;0.25</li> </ul>
<ul> <li>SNIP in Scopus</li> </ul>	

International-level scientific paper in the areas of natural sciences, technology, and medical and health sciences is a paper published in a scientific journal that is in the first, second or third quartile (Q1-Q3) of the relevant group of journals in the WoS SCIE database.

International-level scientific paper in the areas of humanities and social sciences is a paper published in a scientific journal that is in the first, second or third quartile (Q1-Q3) of the relevant group of journals in the WoS SSCI or Elsevier Scopus database

### WoS Core Collection Editions (Indexes): where to find them?

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- Journal Citation Reports contain essential journal metrics
- Filter by editions / indexes, also by year, category, publisher, open access etc.
- Useful tool to find journals to publish

Clarivate					
Journal Citation Reports <sup>™</sup>	Journals Categories Publishers Countries/Regions	5			
140 journals	Journal name/abbreviation, ISSN/eISSN, ca	ategory, publisher, co	ountry/region		٩
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	X Citation Index	Edition	Total Citations 👻	2023 JIF →	JIF Quartile
Journals (21,973)	Filter on specific editions of the Web of Science Core Collection. By default, all are selected.	SCIE	8,708	8.5	Q1 Q1
Categories (178)	<ul> <li>✓ Science Citation Index Expanded (SCIE)</li> <li>✓ Social Science Citation Index (SSCI)</li> </ul>	SCIE	17,570	8.3	Q1
Country / region (112)	<ul> <li>Arts &amp; Humanities Citation Index (AHCI)</li> <li>Emerging Sources Citation Index (ESCI)</li> </ul>	SCIE	1,880	8.2	Q1
		SCIE	47,897	7.9	Q1
Citation Indexes • JCR Year •	> >	SCIE	228,589	7.4	Q1
Open Access	>>		<b>55 640</b>		01

#### Journal Citation Reports 11

### **WoS DB Core Collection Index Dynamics**

- New journals enter ESCI (Emerging Sources Citation Index)
- If/when they meet additional criteria, moved to SCIE, SSCI, AHCI
- Usually ESCI journals with JIF in Q1 and Q2 are considered to be moved to SCIE, SSCI, AHCI
- SCIE, SSCI, AHCI journals that decrease in impact, might be moved to ESCI
- Emerging Sources Citation Index (ESCI) is not used in formal evaluation



Source: Web of Science Core Collection

Clarivate<sup>®</sup>

### Web of Science (WoS) DB Main Indicators





JIF (Journal Impact Factor)	All citations to the journal in the current year to items published in the previous two years, divided by the total number of scholarly items (these comprise articles, reviews, and proceedings papers) published in the journal in the previous two years.
Quartiles	Quartile (1/4) rankings based on rank for the <u>JIF</u> in category (Q1 (highest) > Q2 > Q3 > Q4 (lowest))
AIF (Aggregate Impact Factor)	Calculated the same way as the Impact Factor for a journal, but it takes into account the number of citations to all journals in the category and the number of articles from all journals in the category.
Journal Citation Indicator (JCI)	A three-year average of a field-weighted metric called CNCI (Category Normalized Citation Impact), itself a ratio between number of citations to a journal and the number of expected citations to a journal.
Eigenfactor Score	Eigenfactor Score – is based on the number of times articles from the journal published in the past 5 years have been cited, but it also considers which journals have contributed these citations so that highly cited journals will influence the network more than lesser cited journals. Excludes self-citation.
Article Influence Score (AIS)	An average influence of journal's publication, accumulated within 5 years after its publishing

### WoS DB Main Indicators: JIF (Journal Impact Factor) Web of Science Ktu

**JIF Calculation:** all citations to the journal in the current year to items published in the previous two years, divided by the total number of scholarly items (these comprise articles, reviews, and proceedings papers) published in the journal in the previous two years:

 $JIF(2023) = \frac{No. of citations in 2023 of documents published in 2021 and 2022 ($ **7892** $)}{No. of documents in 2021 and 2022 ($ **1234** $)} =$ **6.4** 

- JIF is used as a proxy for the relative importance of a journal within its field;
- Journals with higher impact factor values are given the status of being more important, or carry more prestige in their respective fields, than those with lower values;
- JIF is not used to compare journals from different research areas;
- JIF is often abbreviated as IF.





# JIF in Research Assessment at KTU



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Publication is counted in the performance and competence evaluation, if:

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SOCIAL SCIENCES	NATURAL SCIENCES, TECHNOLOGY, AND MEDICAL AND HEALTH SCIENCES
Publication in a journal that has:	Publication in a journal that has:
JIF in SSCI and/or SCIE (WoS),	JIF in SSCI and/or SCIE and
and/or	JIF/AIF>0.25
SNIP in Scopus	

International-level scientific paper in the areas of natural sciences, technology, and medical and health

sciences is a paper published in a scientific journal that is in the first, second or third quartile (Q1-Q3) of the relevant group of journals in the WoS SCIE database.

International-level scientific paper in the areas of humanities and social sciences is a paper published in a scientific journal that is in the first, second or third quartile (Q1-Q3) of the relevant group of journals in the WoS SSCI or Elsevier Scopus database

# JIF & JCI

### Clarivate<sup>™</sup> Web of Science

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Journal Impact Factor (JIF) – in any given year, the impact factor of a journal is the average number of citations received per paper published in that journal during the two preceding years. <u>Not</u> used to compare journals from different research

#### areas.

Journal Citation Indicator (JCI) is a three-year average of a field-weighted metric called CNCI (Category Normalized Citation Impact), itself a ratio between number of citations to a journal and the number of expected citations to a journal. Normalized by research areas. <u>Can be used to compare journals from</u> <u>different research areas.</u>

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 Quartile in Category - quartile rankings based on rank for the JIF. Quartiles are defined as:

> **Q1 0.0 < Z \le 0.25 Highest** Q2 0.25 < Z  $\le$  0.5 Q3 0.5 < Z  $\le$  0.75

Q4 0.75 < Z (Lowest)

- Z=(X/Y) where X is the journal rank in category and Y is the number of journals in the category.
- Q1-Q3 are more valued, i.e. it is encouraged to publish in such journals

#### Quartile of REVIEWS IN CHEMICAL ENGINEERING:

#### Rank by Journal Impact Factor

CATEGORY	. Learn more					~
ENGINE	ERING, CHE	EMICAL				QI
39/17	0					
JCR YEAR	JIF RANK	JIF QUARTILE	JIF PERCENTIL	E	ì	
2023	39/170	Q1	77.4			Q2
Rank by JIF	before 2023 for	ENGINEERING, CHEM	IICAL			
Rank by JIF	before 2023 for	ENGINEERING, CHEM	lical			
Rank by JIF	<b>before 2023 for</b>	ENGINEERING, CHEM	lical			
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# Quartiles in Research Assessment at KTU

Publication is counted in the performance and competence evaluation, if:

Web of Science

 It is important where your publication is published because journal metrics are used to determine researchers' performance

SOCIAL SCIENCES	NATURAL SCIENCES, TECHNOLOGY, AND MEDICAL AND HEALTH SCIENCES
<ul> <li>Publication in a journal that has:</li> <li>JIF in SSCI and/or SCIE (WoS), and/or</li> <li>SNIP in Scopus</li> </ul>	<ul> <li>Publication in a journal that has:</li> <li>JIF in SSCI <u>and/or SCIE and</u></li> <li>JIF/AIF&gt;0.25</li> </ul>

International-level scientific paper in the areas of natural sciences, technology, and medical and health

sciences is a paper published in a scientific journal that is in the first, second or third quartile (Q1-Q3) of the relevant group of journals in the WoS SCIE database.

International-level scientific paper in the areas of humanities and social sciences is a paper published in a scientific journal that is in the first, second or third quartile (Q1-Q3) of the relevant group of journals in the WoS SSCI or Elsevier Scopus database

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# **Aggregate Impact Factor - AIF**

AIF



ktu

- Aggregate Impact Factor takes into account the number of citations to all journals in the category and the number of articles from all journals in the category;
- An aggregate Impact Factor of 1.0 means that that, on average, the articles in the subject **category** published one or two years ago have been cited one time;
- **JIF/AIF** is used to compare journals between <u>different research categories</u>.

Journal in one category:	Journal Cit	tation Reports <sup>™</sup>	Journals Categories Publishers	Countries/Regions					
$\frac{JIF}{AIF}$	1 cate See all 21 G	gory	Journal name/abbrev	ation, ISSN/eISSN, categ	ory, publisher, country/region		٩		Export
Journal in several categories (divided by		MATERIALS SCIENCE, MULTIDIS	CIPLINA O						🎉 Customize
average AIF): <i>JIF</i>	Filter	Category - MATERIALS SCIENCE, MULTIDISCIPLINARY	Group 👻 Materials Science; Multidisciplinary	Edition ESCI, SCIE	#ofjournals ▼ 439	Citable Items 👻 180,393	Total Citations 👻 7,964,949	Median impact factor $\Rightarrow$ 2.9	Aggregate impact factor = 5.7

# JIF/AIF in Research Assessment at KTU

Clarivate<sup>™</sup> Web of Science

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# **WoS Indicators: Journal Prestige**



### ktu

#### **Eigenfactor Score**

- Citations are calculated from the indicated year;
- Interval for cited publications 5 years
- Composed in a way that the sum of Eigenfactor for all JCR indexed journals would be 100: value of 1 indicates that the journal accumulated 1% of overall influence
- Journal self citations are not included

#### **Article Influence Score (AIS)**

- An average influence of journal's publication, accumulated within 5 years after its publishing;
- Calculated by multiplying Eigenfactor Score by 0.01 and dividing by the number of publications in the journal:

0.01 \* EigenFactor Score X

X = 5-year Journal Article Count divided by the 5-year Article Count from All Journals.

#### Eigenfactor and AIS are not used in the formal research evaluation at KTU

## **Scopus DB Main Indicators**





#### Scopus is usually used for social sciences

CiteScore	Based on the number of citations to documents (articles, reviews, conference papers, book chapters, and data papers) by a journal over <u>four years</u> , divided by the number of the same document types indexed in Scopus and published in those <u>same four years</u> .
CiteScore Quartile	Quartile (1/4) rankings based on rank for the <u>CiteScore</u> (Q1 (highest) > Q2 > Q3 > Q4 (lowest))
SNIP – Source- Normalized Impact per Paper	Measures the contextual citation impact by weighting citations based on the total number of citations in a subject field for a source. It helps you make a direct comparison of sources in <u>different subject fields</u> .
SJR – Scimago Journal Rank	Weighted by the prestige of a journal. Subject field, quality, and reputation of the journal have a direct effect on the value of a citation. A citation from a source with a relatively high SJR is worth more than a citation from a source with a lower SJR.

# **Scopus DB Main Indicators**

Scopus



- CiteScore
- SJR
- SNIP
- CiteScore Quartile:

Q1 0.0 <  $Z \le 0.25$ Highest Q2 0.25 <  $Z \le 0.5$ 

Q2 0.25 <  $Z \le 0.5$ Q3 0.5 <  $Z \le 0.75$ Q4 0.75 < Z (Lowest)

Q1-Q3 are more valued,
 i.e. it is encouraged to
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## Scopus CiteScore & Web of Science JIF

- Scopus and WoS use different methodology calculating their CiteScore and JIF respectively.
- CiteScore is calculated: citations from 4 years divided by number of documents in those same 4 years.
- JIF is calculated: Citations received in a referenced year divided by a number of documents in previous 2 years. That is why these two impact indicators differ significantly.
- Citations take time to accumulate, so the longer the period the more citations tend to accumulate. That is why usually CiteScore is higher than JIF for the same journal.



# CiteScore 2023 (Scopus) 2021 2022 2023 2024



# ktu

26

## **Comparison between Web of Science & Scopus**

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- Web of Science (WoS) is used more for publications in natural sciences, engineering & technology, medical & health sciences, agricultural & veterinary sciences
- **Scopus** is used more for social sciences
- Great overlap between WoS and Scopus
   Strengths:
- WoS: More options for citation analysis for institutions; more robust author searching – all authors from all publications are indexed, searchable, and unified based on ORCID and Researcher ID profiles; Deeper citation indexing across all content (back to 1900; for Lithuania – since 1990)
- Scopus: more publications in total; compares up to 10 sources by impact metrics: number of citations, number of articles published in a year, % of articles not cited, & % of articles that are review articles, all graphed by year. View secondary documents, which are documents not indexed in Scopus (retrieved from the references or citations of the documents that are covered by Scopus)



Fig. 3. Percentage of unique and overlapping citations in google scholar, Scopus, and Web of Science. n = 2,448,055 citations from all subject areas.

Source: Martín-Martín, Alberto & Orduna-Malea, Enrique & Thelwall, Mike & Delgado López-Cózar, Emilio. (2018). Google Scholar, Web of Science, and Scopus: A systematic comparison of citations in 252 subject categories. Journal of Informetrics. 12. 1160-1177. <u>10.1016/j.joi.2018.09.002</u>.

#### h-index reflects the productivity of <u>authors</u> based on their publication and citation records

The h-index is based on a list of publications ranked in descending order by the <u>times cited</u>: **the value of h is equal to the number of papers (N) in the list that have N or more citations.** *Example: Scientist X has 3 publications with 9, 2 and 1 citations, i.e. 2 publications with 2 or more citations*  $\rightarrow$  *h-index is 2* 

- + Measures both quality and quantity of scientific output;
- + Used at all levels (from author to institution);
- Does not account for the number of authors of a paper;
- Not normalized by research fields;
- Favors established researchers/journals



h-index is on WoS, Scopus, Google Scholar, but all of these have different collections of documents that they use, so the h-index is also different.

# **Bibliometric Reports for Individual Researchers**

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#### Publications from 2019-2023:

Name	*****
Web of Science ResearcherID	*****
ORCID	*****
Documents in Q1 Journals	37
Documents in Q2 Journals	8
Documents in Q3 Journals	2
Documents in Q4 Journals	0
All Open Access Documents	26
Industry Collaborations	2
Times Cited	3073
Category Normalized Citation Impact	3.70
Citation Impact	65.38
Journal Normalized Citation Impact	1.29
H-Index	19
Documents in Top 1%	7
Documents in Top 10%	15
Domestic Collaborations	4
International Collaborations	43



# **Bibliometric Reports for Institutions/Departments**

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### Production

- Number of documents
- Number of citable documents

### Collaboration

- Number of documents with international collaboration
- Number of documents with industry collaboration

### Impact

- % of papers in Q1 journals
- Category Normalized Citation Impact

### Excellence

- % Highly Cited Papers
- Papers in Top Journals



Altmetrics are a simple and effective way of understanding who is engaging with research online and what they're saying.

- Altmetrics track the attention research receives on social media, blogs, news outlets, and other online platforms.
- Can complement traditional citation metrics by showcasing research impact beyond scientific community.
- Tools to Track Altmetrics:
  - Altmetric
  - OurResearch
  - PlumX

Altmetrics are not used in formal research assessment (as of 2024)



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# **Criticism of Quantitative Research Assessment**

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- Distorts good scientific practices
- Presents mean of data that are not normally distributed; *median* of these data suggested as more appropriate
- Impacts behavior of scholars, editors and other stakeholders (*publish or perish* culture)
- Some institutions (for example, Utrecht University) rejected Impact Factor as an indicator



Source: The Leiden Manifesto for research metrics

### **Qualitative Research Assessment**

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**DORA** (Declaration on Research Assessment) seeks to advance practical and robust approaches to research assessment globally and across all scholarly disciplines;

The Leiden Manifesto - ten principles to guide research evaluation;

**COARA** (Coalition for Advancing Research Assessment) - aims to shift focus on **qualitative** assessment, made by experts; **quantitative evaluation should support qualitative**.



Illustration by David Parkins

## CoARA – Coalition for Advancing Research Assessment ktu

- Focus research assessment criteria on quality;
- Recognize the contributions that advance knowledge and the (potential) impact of research results;
- Recognize the diversity of research activities and practices, with a diversity of outputs, and reward early sharing and open collaboration;
- Use assessment criteria and processes that respect the variety of scientific disciplines, research types, research career stages, and that acknowledge multi-, inter-, and trans-disciplinary as well as inter-sectoral approaches;
- Acknowledge and endorse the diversity in research roles and careers, including roles outside academia;
- Ensure gender equality, equal opportunities and inclusiveness (DEI).



### If you have any questions, please contact us

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# **Research Assessment Indicators and Tools**

The Library of Kaunas University of Technology biblioteka@ktu.lt