

The state of contemporary Science in Uzbekistan

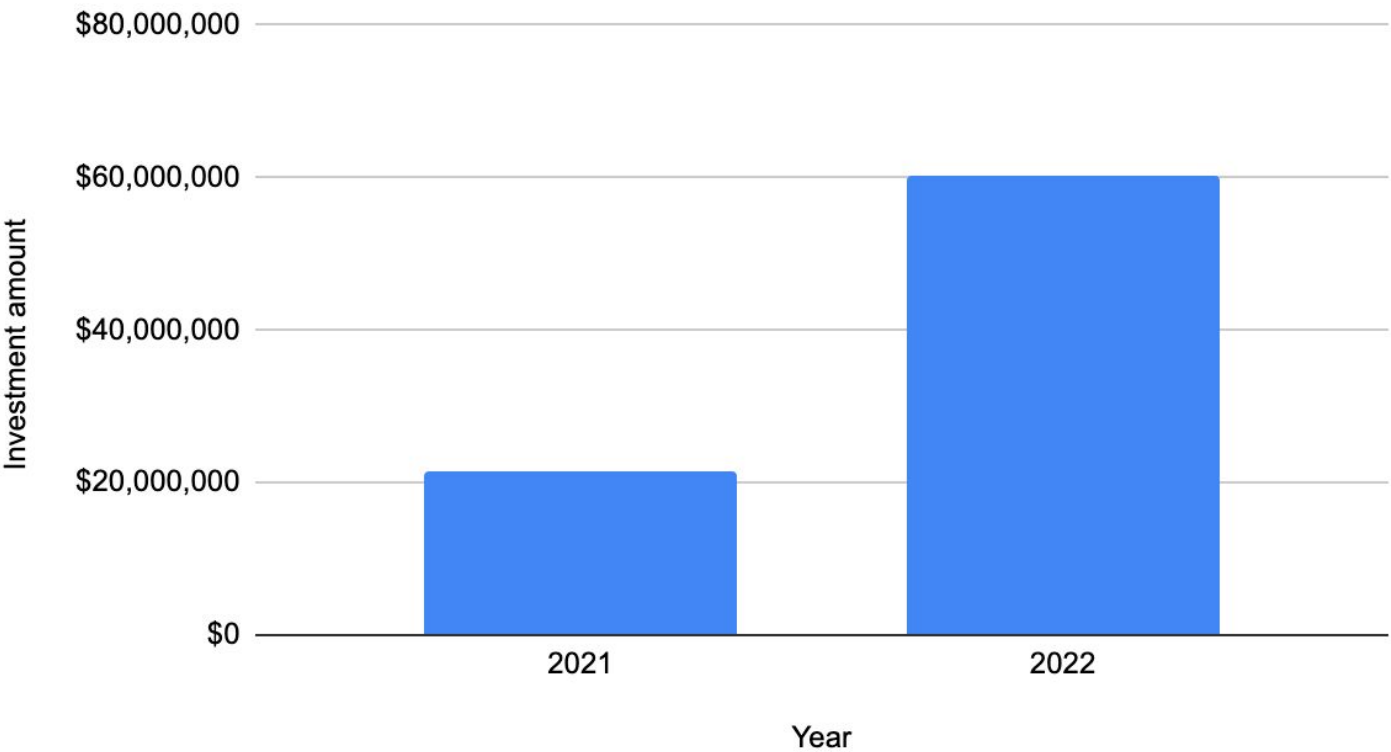
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Uzbekistan

Republic of Uzbekistan	
Declared independence	31 August, 1991
Area	448,978 km ² (56th)
Population	~ 31 million (47th)
GDP (nominal) Total	\$73 billion (78th)
GDP (nominal) per capita	\$2,071 (171th)
Number of people working in research and development	30,000
Number of people with higher education working in research and development	27,000

Investment into the development of science by government



Top 10 countries with expenditures on R&D

	Country/Region	Expenditures on R&D (billions of US\$, PPP)	% of GDP <u>PPP</u>	Expenditures on R&D per capita (US\$ PPP)
1	United States	612.714	3.1	1,866
2	China	514.798	2.2	368
3	Japan	172.614	3.2	1,375
4	India	158.691	1.3	120
5	Germany	131.932	3.2	1,586
6	South Korea	100.055	4.6	1,935
7	France	63.658	2.2	944
8	United Kingdom	51.702	1.8	762
9	Taiwan	42.945	3.5	1,822
10	Russia	38.549	1	263

Over the last 4-5 years ...

- **28 scientific organizations** and **4 innovative technology parks** have been created
- **The salaries** of scientists have **tripled**



Over the last 4-5 years ...

- **Academy of Sciences of the Republic of Uzbekistan** have been improved, which includes **28 research institutions** and **4 state museums**
- In the field of scientific and innovative activities, **2 Laws, 5 Decrees** and **26 resolutions of the President, 35 resolutions** and **7 orders of the Cabinet of Ministers** were adopted



Challenges and problems



Challenges and problems

Thesis defense and conducting research: Choosing a proper topic

- Most of the thesis topics are either **irrelevant** to the works that were conducted or **very weak** with regards to the science.
- Many cases of **changing the topics** of theses which also shows the **lack of proper analysis on the topic**



Challenges and problems

Overwhelming bureaucracy in research activities

- The **topic** of a thesis should be submitted as a **special Bulletin** into the **government portal** in the beginning of the research
- Even **a small change** is required to be **specified** on the special **Bulletin** which makes it an overwhelming process.



Challenges and problems

Low engagement of local science Council.

Although all the research activities are conducted within a research institution and there is inner pre-defense conducted by the local science Council which consists of the people of research institutions, the **final decision** is made by higher **Attestation Commission under the Cabinet of Ministers**.



Challenges and problems

The thesis defense requires the topic to be **implemented in real-world applications**.

Since not all the research works can be implemented directly, or is meant to solve future problems, this requirement has become one of the big barriers for the researchers that are planning to defend their theses.



Challenges and problems

Publishing research works.

Three cases after submission:

- the submitted work is rejected
- the submitted work is returned back for major / minor modifications, and if the authors modify according to the given feedback, then accepted
- the authors were asked for money for publication

Challenges and problems

Publishing research works.

- So, it is very common for researchers from Uzbekistan to work with “**predatory**” journals (third case).
- So according to Publons, there are more than **1000 predatory journals** which published more than 160 thousand articles in 3 years that are indexed by Scopus.
- And 32.5% and 59.7% of all the published by Uzbek institutions respectively in 2019 and 2020 were excluded from Scopus.

Challenges and problems

No uniform government policy for the development of science in Uzbekistan.
There are 3 government organizations that are responsible for science:

- **Ministry of Innovative Development**, which is responsible for developing innovation and scientific-technical environment in the country
- **Ministry of higher and secondary-specialized education**, which is responsible for the development of educational-pedagogical, scientific-methodological instructions for universities and organizes educational environments for research activities.
- **Attestation commission** at the Cabinet of ministry of Uzbekistan that is authorized for the attestation of education and making final decisions for thesis defense

The state of publications by Uzbek institutions



Rankings of Uzbekistan in science (by publications)

Country region rank:	28
Country world rank:	84
Total universities:	48 (that have indexed publications)
Number of scientists:	1094 (that have indexed publications)

Top 10 Uzbek Universities and their rank (by publications)

#	University	Founded	Country Rank	Region Rank	World Rank
1	Jizzax State Pedagogika Instituti	1974	1	309	1543
2	Tashkent State University of Economics	1931	2	1095	3531
3	Tashkent Institute of Irrigation and Agriculture Mechanization Engineers	1923	3	1429	4315
4	Andijan State Medical Institute	1955	4	1597	4650
5	Karakalpak State University	1976	5	1684	4864
6	Bukhara State University	1990	6	1903	5404
7	Chirchiq State Pedagogical Institute of Tashkent Region	2016	7	2068	5809
8	Samarkand State University	1927	8	2078	5836
9	Bukhara State Medical Institute Abu Ali ibn Sin	1990	9	2241	6193
10	Tashkent State Pedagogical University	2016	10	2256	6218

Top 10 Uzbek Universities and the scientists work there

#	University	Scientists in Uzbekistan Top 1000	Scientists in World Top 2%	Scientists in World Top 10%	Total Scientists in Index
1	Jizzax State Pedagogika Instituti	146	1	6	153
2	Tashkent State University of Economics	41	0	1	42
3	Tashkent Institute of Irrigation and Agriculture Mechanization Engineers	20	0	1	20
4	Andijan State Medical Institute	115	0	0	117
5	Karakalpak State University	84	0	0	86
6	Bukhara State University	55	0	0	55
7	Chirchiq State Pedagogical Institute of Tashkent Region	74	0	0	75
8	Samarkand State University	13	0	0	13
9	Bukhara State Medical Institute Abu Ali ibn Sin	18	0	0	18
10	Tashkent State Pedagogical University	8	0	0	8

Top 10 scientists of Uzbekistan Universities and their rank

Name	University	Country	Region	World	University
Ochilova M Baxti	1	1	1669	18523	Jizzax State Pedagogika Instituti
Anora Javlievna Jabbarova	2	2	4731	44584	Jizzax State Pedagogika Instituti
Nodira I Soatova	3	3	4788	44987	Jizzax State Pedagogika Instituti
Jamshid B Orishev	4	4	5103	47381	Jizzax State Pedagogika Instituti
Shayzak Kholmuminov	1	5	5457	50006	Tashkent State University of Economics
Afanasiy Li	1	6	6520	57725	Tashkent Institute of Irrigation and Agriculture Mechanization Engineers
Shoira Doniyorova	5	7	8028	68884	Jizzax State Pedagogika Instituti
Jamoliddin A Jurayev	6	8	9880	81333	Jizzax State Pedagogika Instituti
Vladimir A Aleynik	1	9	13962	107713	Andijan State Medical Institute
Babich M Svetlana	2	10	13977	107769	Andijan State Medical Institute

Top 10 scientists of Uzbekistan Universities and their rank

#	Name	Subject	H INDEX		i10 INDEX		CITATION	
			Total	Last 5 year	Total	Last 5 year	Total	Last 5 year
1	Ochilova M Baxti	Social Sciences / Social Sciences philosophy	73	73	104	104	8566	8491
2	Anora Javlievna Jabbarova	Social Sciences / Linguistics and Literature Philology Linguistics English Language Teaching and Methodology	55	55	58	58	10026	10026
3	Nodira I Soatova	Social Sciences / Linguistics and Literature Literature Classical Literature Literature History Literary theory Children's Literature	55	55	69	69	4972	4972
4	Jamshid B Orishev	Natural Sciences / Physics Technology education Pedagogy	54	54	80	80	6047	5995
5	Shayzak Kholmuminov	Economics & Econometrics / Economics economics of labour market employment and unemployment unofficial employment poverty reduction math in economics	53	53	56	56	4879	4869

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			Total	Last 5 year	Total	Last 5 year	Total	Last 5 year
6	Afanasiy Li	A.o. профессора ТАААМСХ техНические Науки	50	31	93	66	8747	3239
7	Shoira Doniyorova	Social Sciences / Linguistics and Literature Philology Modern Uzbek literature History	47	47	63	63	3153	3153
8	Jamoliddin A Jurayev	filiologiya	44	44	48	48	3663	3663
9	Vladimir A Aleynik	Medical and Health Sciences / Physiology physiology Normal physiology gastroenterology endocrinology therapist	39	39	63	62	4057	3925
10	Babich M Svetlana	Social Sciences / Social Sciences social hygiene health management	39	39	62	61	3939	3839

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Modern achievements in science by Uzbek institutions



Modern achievements: Astronomy

For the first time in the history of independent Uzbekistan in October 2007, at Maidanak observatory, **new minor planet** number 2007 TN2 was opened in the solar system, which in 2009 was assigned the number 210 271 by the Harvard Minor Planet Center:

- Distance from Sun: 3.044 Astronomical Units, or approximately 455 million kilometers
- Distance from Earth: about 2.044 AU, or approximately 306 million kilometers
- Orbit around Sun: 4.29 Earth years
- Range of Possible Diameters: 840 meters to 1.9 kilometers

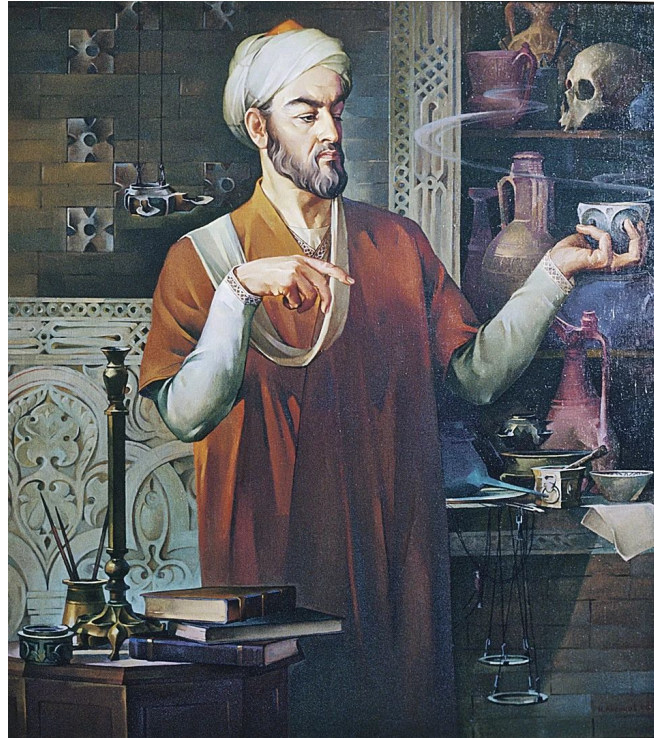
Modern achievements: Physics

- Development of the fundamentals of the **nuclear theory of heavy elements**, including a three-stage nuclear fission of uranium to form magnesium isotope, optical solitons in condensed systems, ionic sputtering of surface as nanoclusters, radiation coloring of crystals, etc.
- Using the **concentrated solar energy**, the stable superconducting materials with increased to 110 - 150 degrees of Kelvin temperature of transition to the superconducting state have been produced for the first time in the world.

Modern achievements: Chemistry

- Opened a **new mechanism** in modern supramolecular chemistry, establishing dependence of the structure of the particular substances on the conditions of their formation.
- A new research field was developed – **adsorption-energy stoichiometry** with the development of new concepts and producing the semiempirical and theoretical equations of isotherms and differential heats of adsorption, and energy, kinetic, molecular and structural criteria were created for the study of the mechanism of adsorption and catalytic reactions

Major research achievements of Uzbekistan in history



Abu Ali ibn Sina (Avicenna) (980 – June 1037 CE)



Regarded as one of the most significant **physicians**, **astronomers**, **philosophers**, and **writers** of the Islamic Golden Age, and the **father of early modern medicine**.

- most famous works are **The Book of Healing**, a **philosophical and scientific encyclopedia**, and **The Canon of Medicine**, a medical encyclopedia which became a standard medical text at many medieval universities and remained in use as late as 1650.

Al Biruni (973 – after 1050)



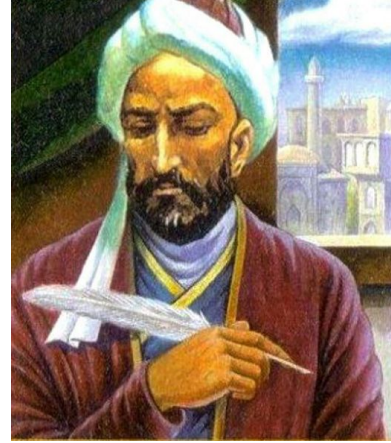
Al-Biruni was well versed in **physics, mathematics, astronomy, and natural sciences**, and also distinguished himself as a **historian, chronologist, and linguist**.

- He was the first able to obtain a simple formula for measuring the **Earth's radius**. Moreover, he thought possible **the Earth to revolve around the Sun**, the existence of gravity and developed the idea the geological eras succeed one another

Al-Farghani (798/800/805–870)

Al-Ferghani fruitfully worked in the field of:

astronomy, mathematics and geography.



Al-Farghani composed several works on **astronomy** and **astronomical equipment** that were widely distributed in Arabic and Latin and were influential to many scientists.

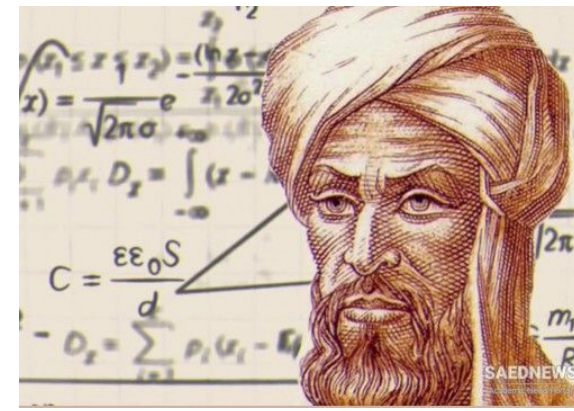
His authorship belongs to the proof of the **spherical shape of the Earth**, the establishment of the points of the winter and summer solstices and the **discovery of spots on the surface of the Sun**.

Al-Khwarizmi (c. 780 – c. 850)

Al-Khwārizmī who produced vastly influential works in:

- **mathematics**, **astronomy**, and **geography**

Major accomplishments were the books he wrote on **mathematics** and **science**. His mathematical books introduced the ideas of **algebra** and **Hindu-Arabic numerals** to Western mathematicians during the Middle Ages. His scientific works concerned geography and astronomy as well.



Thank you for your attention!

References:

- <https://en.wikipedia.org/wiki/Uzbekistan>
- Innovation for Sustainable Development, Review of Uzbekistan, UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE, 2022
- <https://uz24.uz/ru/articles/o-razvitti-nauki>
- <https://www.adscientificindex.com/>
- <https://www.academy.uz/en/page/fanlar-akademiyasining-ilmiy-hajmdor-mahsulot-eksporti-haqida-malumot>
- <https://uzdaily.uz/en/post/11066>