

## Academia and Science: the Ideals we Live and Strive for

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We study, research and teach at one of the finest *academic* institutions; we work hard and enjoy learning, practicing the ways of, and advancing *science*. But what exactly constitutes, which are the principles defining, science and academia?

Historically, *Academia* was the name of a sanctuary outside of ancient Athens dedicated to the Greek goddess of wisdom. Here Plato's school of philosophy was founded, around 387BC, and continued by successors (such as Aristotle) for over 300 years until its destruction by the Romans. Yet, relinquishing this geographic origin, the *concept* (Platonism!) of institutionally combined research and higher education gradually expanded over the world: the classical *Mouseion at Alexandria*, the *Pandidakterion* in Constantinople, the *University of Timbuktu*, all already exhibited the following characteristics:

- a) offering serendipity through deliberate separation from mundane life
- b) focusing on the unlimited intellectual realm (theory)
- c) providing sanctuary/safe space, free from political influence
- d) increase creativity via scholarly exchange, collaboration and support
- e) investigate a deliberately broad variety of topics (*universitas*)
- f) create, collect, verify, assess, select, organize, and distribute knowledge through scholars and scripture.

The *academic* system thus constitutes an essential antipode to the economic one: quotidian labour for monetary reward by harnessing limited physical resources according to rules of demand, power, exploitation, and competition. Introducing such economic principles to academia would create an oxymoron!

The honour associated with academia as well as *academic freedom* (c) regularly ignites envy, wrath, and reproaches — particularly from those craving control over thought and truth. (Galilei had to answer to the Catholic Church.) In fact the principles of *academia* are frequently under attack, and the *March for Science* reminds of the need to continuously defend them, to speak inconvenient truths. Quoting Edsger Dijkstra: “*It is not the task of the University to offer what society asks for, but to give what society needs.*”

Now turning to (both natural and social) *sciences*, these further detail the enterprise comprising the above Item (f). In particular the *scientific method* collects techniques and approaches that help (yet do not guarantee) to avoid subjective/opinionated biases; to instead constantly strive for objectivity and verifiability, untainted by hidden hypotheses or dogmatic distortions: such that new scientific contributions can safely build and rely on (and give credit to) predecessor results from anyone in the global community. The state of the art in any scientific discipline thus resembles a building, erected from foundations to sophisticated heights: e.g., from Mathematical Logic via Arithmetic/Algebra, Real and Functional Analysis to

PDEs; from Newtonian Mechanics to both Quantum Theory and Relativity/Cosmology; from transistors, gates, integrated circuits, signal processing, PC hardware, and firmware/BIOS (EE), via (CS) operating systems, algorithm design and analysis, programming languages, implementation/software, and verification, to Artificial Intelligence; from Physics via Chemistry, Biology, and Neuroscience to Psychology. In addition to objectivity and verifiability, Karl Popper has postulated *refutability* as fundamental principle of any scientific claim — lest it be “not even wrong” (Wolfgang Pauli).

Such postulates became necessary, paradoxically, due the huge success and exponential growth of science, particularly during the last century with the advent of *scientist* as a profession. Craving reputation or compelled by administrative rules for promotion, some researchers have started turning to what Richard Feynman called *Cargo-Cult Science*<sup>\*</sup>, and to organizing/contributing to *Fake Conferences*<sup>†</sup>. In fact already Robert K. Merton had noted an increase in scientific aberrations; and thus collected and codified five foundational principles of *scientific ethos* with acronym/mnemonic CUDOS:

- Communalism: all scientists share their scientific findings freely to promote collective collaboration.
- Universalism: everyone is welcome to contribute to science — regardless of race, class, heritage, gender, religion, nationality, etc.
- Disinterestedness: scientists must act for the benefit of all *academia*, rather than for individual or departmental gain/fame.
- Originality: scientific progress is based on novelty — and therefore punishes plagiarism.
- Scepticism: every scientific claim is systematically subjected to scrutiny by expert peers; i.e., scientists serve each other voluntarily as impartial judges.

Some of these important principles seem to suffer from degradation, though: Filing a patent for instance conflicts with "C" [ISBN 0815749422]; *affirmative action* may contradict "U"; and research incentives violate "D". In fact both *Goodhart's Law* and *Campbell's Law* strongly advise against implementing *any* formal indicators of scientific performance.

To conclude, as students, graduates, researchers, and professors we are all part of *academia*: the world-wide distributed system for research and tertiary education united by the scientific ethos CUDOS. This system, as well as each of its local institutions, complements, and has been carved out from, society and its economic primacy: *benefits* which are easily taken for granted. Let us therefore remember that, as members of KAIST, we simultaneously bear *responsibility* to not only contribute to *science* but also to adhere to, to maintain, and to defend its ideals.

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\* <http://math.ucr.edu/home/baez/crackpot.html>

† <http://doi.org/10.1126/science.caredit.a1600157>