

## TReND-CaMinA: A Low-Cost Open-Source Initiative to Promote Neuroscience in Africa

**Summary** TReND-CaMinA is a residential summer school with the goal of accelerating Africa's emergence onto the global scientific stage by educating young African researchers in computational neuroscience and machine learning—two cost-effective and modern research fields. With successful past editions in Ghana (2023), Rwanda (2024) and Zambia (2025), the CaMinA is run in partnership with *TReND in Africa*, a globally-renowned NGO promoting African development through education. We are committed to accessibility by (i) making our course free to all attending students, (ii) rotating the host country in order to seed local research hubs and (iii) publishing all teaching materials in order that our blueprint may be replicated. TReND-CaMinA is comparatively cheap, costing 50,000USD per edition (less than a typical confocal microscope) and has been funded almost entirely through donations from leading institutions in academia and industry. Across three courses we received nearly 2,000 applications from all over Africa, suggesting there is a strong desire for initiatives of this kind. Many of our students have progressed to more advanced courses, conferences or higher-education programmes, indicating that the course is starting to meet its goals of training and network-building within Africa. Through science and teaching, we aim to foster a more skilled and competitive African society that brings development to the continent and more diverse perspectives to the global scientific landscape.

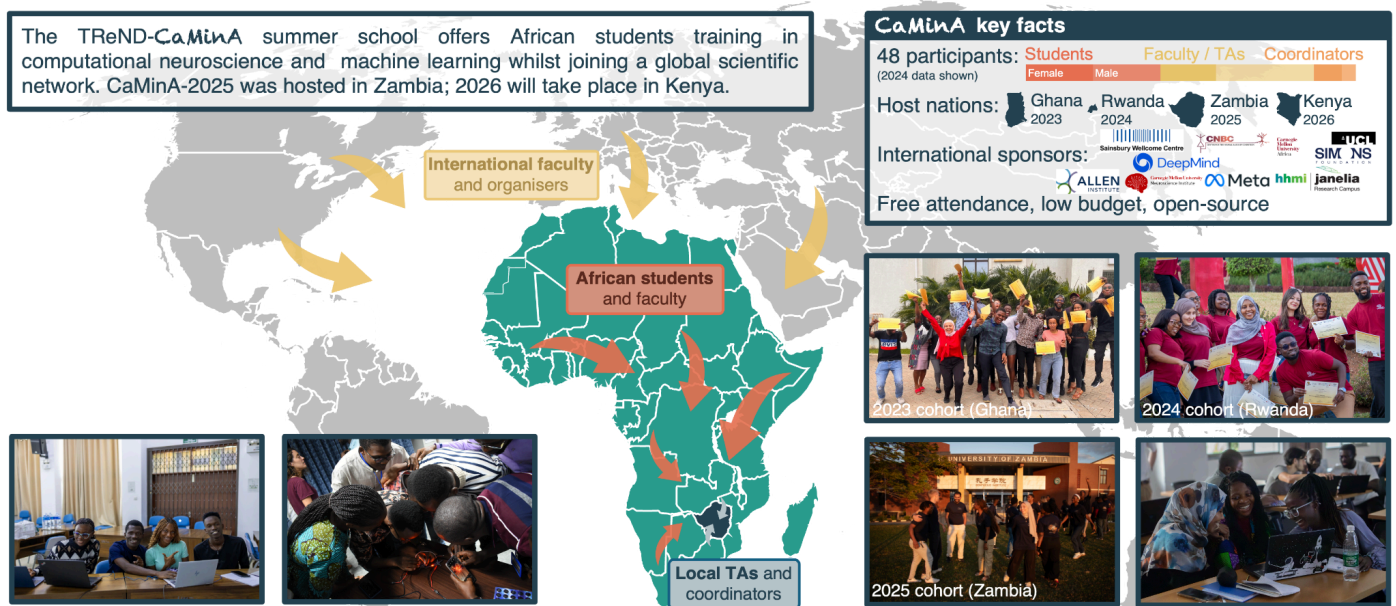


Figure 1: The CaMinA visual abstract. Summary (top-left), key statistics and sponsors (top-right) and photos.

**Challenges** Neuroscience, despite its origins in Africa<sup>[1]</sup>, is a field dominated by non-African researchers<sup>[2]</sup>. There are many reasons for this including a lack of funding, a lack of training programmes, and sub-critical network size<sup>[3]</sup> at the country and continental level, collectively leading to a self-perpetuating “brain-drain”<sup>[4]</sup>. Furthermore, *experimental* neuroscience is a particularly expensive pursuit with new microscopes costing hundreds of thousands of dollars, and new institutes costing hundreds of millions, creating an often insurmountable barrier to entry. This global imbalance is not just a problem for aspiring African researchers but also for the worldwide neuroscientific community that misses out on contributions and perspectives that could enrich and diversify the scientific domain. Unlike experimental neuroscience, *computational* neuroscience, and the interrelated field of machine learning, are often not as expensive. Given the right training, little more than a laptop and access to open-source datasets can be enough to start making progress<sup>[5]</sup>. Furthermore, these fields are multidisciplinary with the potential to spur progress in related areas from medicine to robotics and are of growing importance to the global economy. As such, we propose that **introductory-level training programmes in computational neuroscience and machine learning are a cost-effective means to accelerate Africa's emergence onto the global scientific stage**. Here we present one such effort.

**TReND-CaMinA** We (a group of junior research trainees) founded the TReND<sup>[6]</sup> course in Computational Neuroscience and Machine Learning in Africa (TReND-CaMinA), an annual, residential, two-and-a-half-week summer school. Our primary goals are: to train a new cohort of African researchers in computational techniques; to build a lasting intra-continental network of junior researchers; and to forge inter-continental partnerships that support the flow of researchers to and from Africa, connecting its institutions to the global scientific community. The course

brings together 20 African students from diverse backgrounds and ~20 teachers (African and non-African neuroscience and ML experts at various career stages) for a program structured around three pillars: theoretical and hands-on teaching sessions, supervised group research projects using public datasets (led by the Allen Institute), and guest lectures from academic and industry leaders. To encourage replication, all our materials are made publicly available and, upon completion, students join an alumni network where opportunities are shared and career support is provided. Our project is inspired by related schemes like the *Imbizo*<sup>[7]</sup> and *Neuromatch*<sup>[8]</sup>, but is tailored exclusively for African students and teaches at a more introductory level.

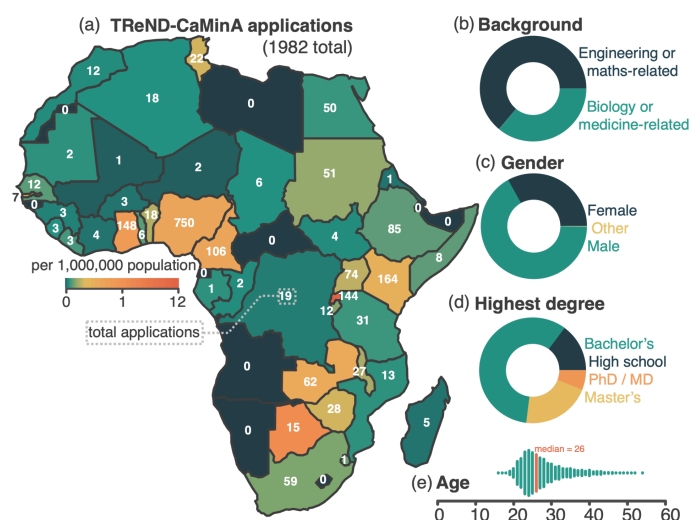
Each course operates on a budget of ~50,000USD—a small amount compared to comparable courses (~150,000USD for the *Imbizo*<sup>[9]</sup>)—which covers all costs for the selected students including international travel, accommodation and meals. This is made possible through a hybrid funding model. Direct costs are covered by grants and donations from institutions in the Global North. This is supplemented by the significant in-kind contribution of teaching, voluntarily provided by both local and international lecturers, and teaching space, provided by the local university. Furthermore, international instructors typically fund their own travel to the course through their home institutions, a crucial and non-trivial source of funding from the Global North.

**Progress** TReND-CaMinA provides an entry point for students who feel unprepared for more advanced international programs. An enthusiastic response has confirmed the demand for this approach: we received 1,986 applications from 41 countries and trained, to date, 60 students. Our applications skew around the locations of past courses (Ghana [3.2x continental average], Rwanda [11.4x] and Zambia [2.3x]) as well as countries listing English as an official language [1.8x].

The most significant measure of our impact lies in the subsequent success of our alumni. In a follow-up survey one-year after the course 88% of alumni reported that the course had helped their career. 64% said that they had participated in international neuroscience- or ML-related courses, workshops or conferences. Following the 2023 course, six of our students were accepted into the prestigious *Imbizo* summer school, representing nearly a third of that year's entire African cohort. Five were awarded the competitive COSYNE student travel award; however, three couldn't secure visas to attend (a common problem faced by Africans, highlighting the need to bring research to the continent). Some students have gone on to set up their own meetings or workshops<sup>[10,11]</sup>, citing TReND-CaMinA as inspiration. We will continue to track the progress of our students and collect feedback to better align the course with their needs.

**Conclusion** Addressing the systemic barriers that limit African participation in global science is a task that no single initiative can solve alone. However, our experience with TReND-CaMinA demonstrates that targeted, community-driven efforts can yield impact with relatively modest resources, serving as a proof-of-concept for a scalable, shareable and cost-effective model. Looking to future editions—projected to take place in Kenya and Nigeria—we aim to expand support by establishing internship opportunities for our alumni within our global network and to provide an internal budget for conference and travel expenses. By presenting our work and its outcomes, we hope to foster a conversation about how our global community can better align its efforts with mechanisms proven to empower the next generation of African neuroscientists.

**References** [1] Russell, V. A. Notes on the recent history of neuroscience in Africa (2017). [2] Maina et al., Two decades of neuroscience publication trends in Africa (2021). [3] Besharati et al., Accelerating African neuroscience to provide an equitable framework using perspectives from West and Southern Africa (2023) [4] Dei et al., What is to be done? A look at some causes and consequences of the African brain drain. (2002). [5] Akil et al. Neuroscience Training for the 21st Century (2016) [6] Baden et al. TReND in Africa: Toward a Truly Global (Neuro)science Community (2020) [7] Currin et al. Think: Theory for Africa (2019) [8] van Viegen et al. Neuromatch Academy: Teaching Computational Neuroscience with Global Accessibility (2021) [9] Estimated from Imbizo webpage FAQs stating a budget of \$5500 per student. [10] BioRTC Computational Neuroscience Course (2025) [11] NeuroAspire Summer School (2025)



**Figure 2:** Application statistics to TReND-CaMinA across all years (a) A heat map of applications, normalised per 1 million population, by country. Numbers show un-normalised application counts. (b, c, d) Applicant distributions by background, gender, highest degree and age at time of application.