

AFRICAN RESEARCH UNIVERSITIES ALLIANCE (ARUA)

Towards developing a Collaborative PhD Program across ARUA Member Universities

Experiences from the University of Ghana, Ghana

**A Research Report Produced for ARUA by the
Human Sciences Research Council (HSRC)**

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1. Introduction and background

1.1 Introduction to research

This report highlights the status of PhD education in Ghana. Using the University of Ghana as a case study, the report provides an overview of the country's socio-economic status which has a bearing on how universities organise PhD programmes, and which may influence the direction of the design of collaborative programmes as envisaged by the African Research Universities Alliance (ARUA).

Detailed are the national and institutional policy and operational frameworks for PhD programmes at the University of Ghana; the nature of student access and progression policies across the programmes; opportunities for designing collaborative arrangements; and challenges that need to be addressed. The report is divided into five sections. The next section provides an overview of Ghana's socio-economic and political dynamics, including a brief description of the Ghanaian higher education landscape. Section three delves into the case study of the university and the two selected programmes. Section four presents the findings from the data collected from the two case study programmes. Section five provides implications from the findings while section six provides some recommendations and conclusions.

1.2 Overview of Ghana: socio-political

Ghana, formerly known as the Gold Coast, gained independence from the British in the year 1957, becoming the first sub-Saharan nation to be free from colonial rule. Ghana is regarded as one of the most politically stable countries in West Africa and has a population of approximately 32 000 000 people and a gross domestic product (GDP) per capita of US\$1980.00 (See appendix 1). The major sectors driving economic activities in Ghana include agriculture, construction, mining, manufacturing, and tertiary. The human development index (HDI) is 0.611 and the unemployment rate is 4.40% as of the first quarter of 2022. The youth unemployment rate is much higher and stands at 13.4%, with only 10% of university graduates finding jobs as of 2021¹.

Since Ghana's independence in 1957, the country has been striving for higher education (HE) to achieve an education system that produces a scientifically and technically oriented society. The

¹ <https://www.afdb.org/en/documents/african-economic-outlook-2021>

University of Ghana was founded in 1948 for the sole purpose of promoting tertiary education and research². Over the years, 15 public tertiary institutions have been built across the 16 regions of the country to further higher education and knowledge production. Ghana continues to invest significantly in creating more opportunities for tertiary education by establishing institutions, and training qualified staff for proper learning.

Table 1: Socio-economic overview of Ghana

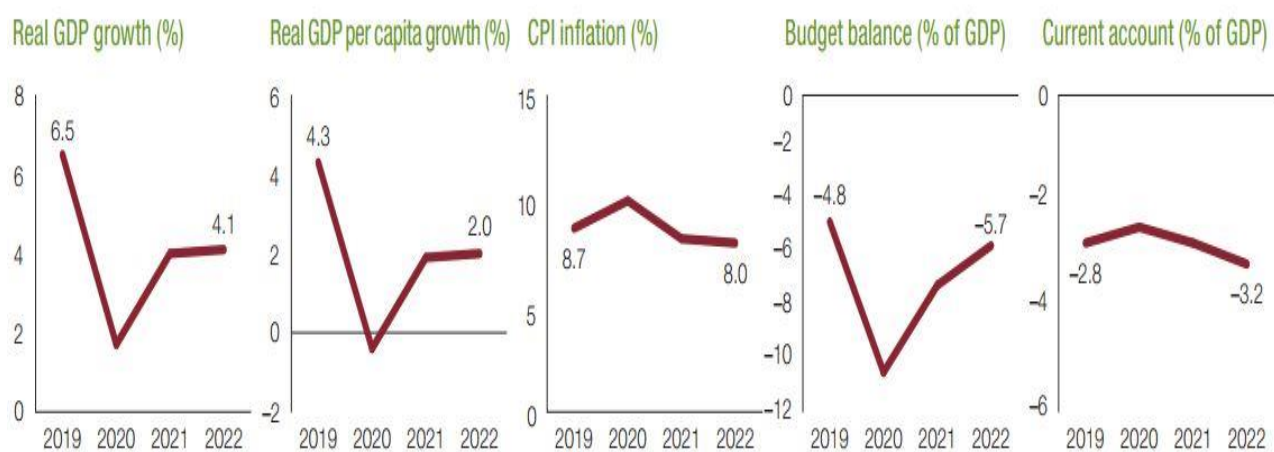
Name of Country	Ghana	
National Population	32,395,450	
GDP per capita	US\$1980.00	
Human development index	0.611	
Unemployment rate	<ul style="list-style-type: none"> ● 4.40% as of 2022. ● Youth unemployment rate: 13.4% as of 2021. ● Graduate unemployment rate: 10% of graduates find jobs after university. 	
Main economic sectors	<ul style="list-style-type: none"> ● Agriculture ● Construction ● Mining ● Manufacturing 	<ul style="list-style-type: none"> ● Tertiary sector of the economy ● Tourism ● Mineral
Gross primary enrolment ratio	104.84% in 2021	
Gross secondary enrolment ratio	74.67% in 2021	
Gross tertiary enrolment ratio	17.2% in 2019	
Number of public universities	<ul style="list-style-type: none"> ● 15 national public universities ● 8 technical universities 	
Number of private universities	81 private tertiary institutions	
Name of participating university	University of Ghana	
Total number of doctoral enrolments (latest data)	<ul style="list-style-type: none"> ● Admitted in 2021: 2 649 ● Registered and current: 6 380 	
Number of PhD graduates (latest statistics)	Graduated in 2021: 646	
Higher education expenditure (% GDP)	4.00% as at 2018: most recent data	
Doctoral production per million of population	0.04	

² (www.ug.edu.gh).

1.3 Political and economic landscape of Ghana

The World Bank defines Ghana as a lower-middle income country (Fig. 1) with moderate to good governance³. The hallmarks of its economic and development policies are centred around macroeconomic stability, less restrictive regulation and tackling corruption, privatisation and deregulation, effective tax structure and tax collection, investment in public services, development of the manufacturing sector, and foreign aid. The rapid economic growth of Ghana (7% in 2017 to 2019) was however brought to a standstill by the COVID-19 pandemic.

Figure 1: Ghana's recent economic developments and outlook .



Source: Data are as of December 2020 and are from domestic authorities; figures for 2020 are estimates and figures for 2021 and 2022 are projections by the African Economic Outlook team.

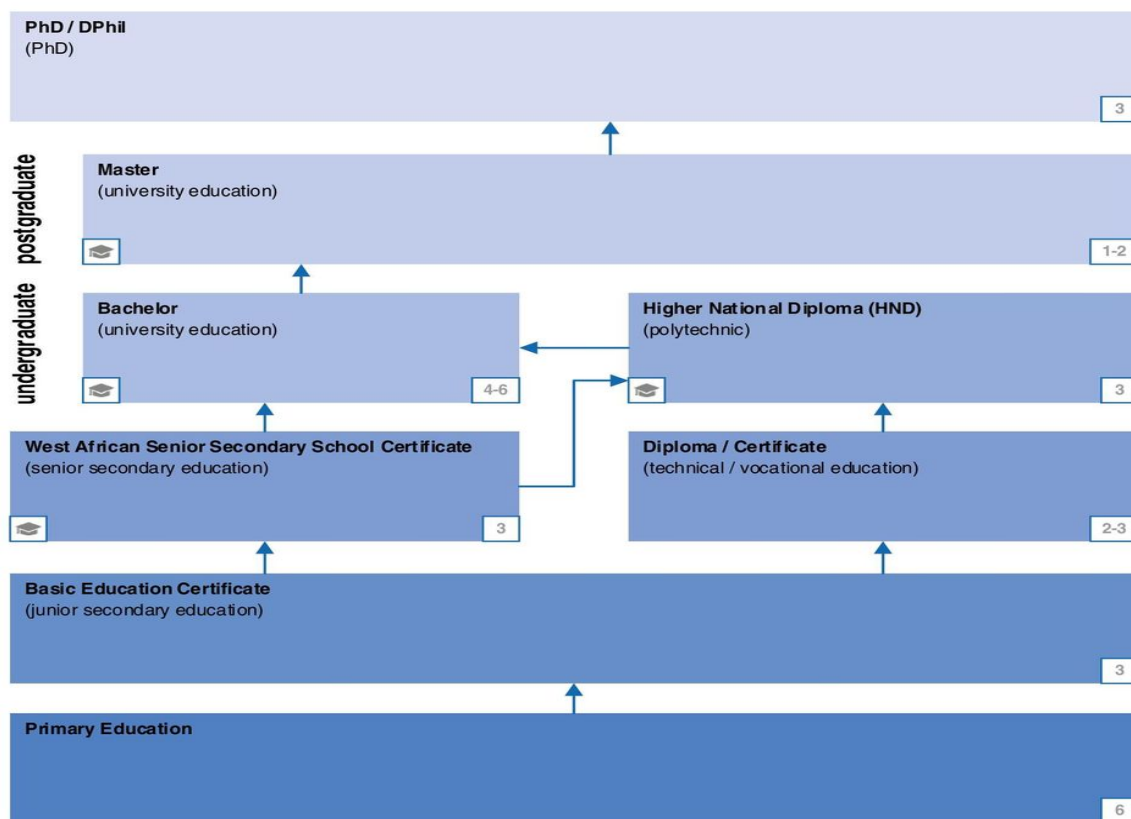
³ <https://www.worldbank.org/en/country/ghana>

2. The higher education landscape

2.1 Overview of the higher education landscape

The current and mainstream educational pyramid runs on a 6-3-3-4 system (primary school: six years; junior secondary/high school: three years; senior secondary school: three years and university bachelor's degree: four years⁴). Basic education, which runs from kindergarten to junior high school, is free and compulsory, and is designed to provide students with basic literacy, numeracy and problem-solving skills in the minimum period of schooling (Ghana Education Service, 2018). Secondary education is structured for academic or vocational programmes and is free since 2016. Tertiary education is undertaken at academic or technical universities structured across three tiers; bachelors, masters and PhD as shown in Figure 2 below.

Figure 2: Educational system in Ghana overview



Source: Education System Ghana | Nuffic | 1st edition, June 2011 | version 2, January 2015)

⁴ <https://wenr.wes.org/2019/04/education-in-ghana>

Most bachelor's degrees in Ghana have a duration of four years. Enrollment is based on merit from the West African Senior Secondary School Certificate Examination (WASSSCE). The applicant should have between an average to outstanding high school performance to be successfully enrolled in a programme of their choice. In 2016, the government of Ghana rolled out a new policy to offer free senior secondary education to all passing students which the general populace has viewed as a welcome initiative, albeit some concerns have arisen in its implementation. These concerns are mainly with the mode of implementation and the associated costs with the whole programme. For doctoral programmes at the University of Ghana, the available programme categories for enrollment in 2016 were natural sciences, engineering and technology (37), humanities and social sciences (16), business, economics and management sciences (8) and education (3) (Alabi and Mohammed, 2018).

2.2 Shape and size of the system

The higher education sector has undergone several metamorphoses in the past 10 years to increase access, improve quality, and promote more research and knowledge productivity. National policies have also been instituted to increase the number of public and private universities, while governance reforms and regulatory frameworks have been developed to provide guidelines on the advancement in both regional and continental education policies and practices.

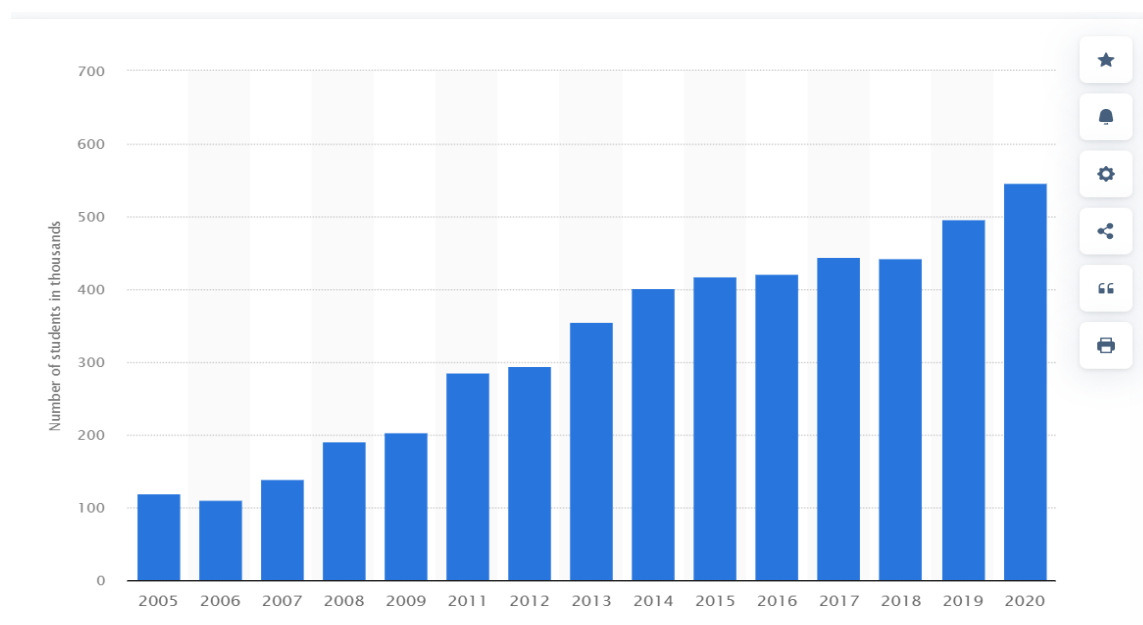
By 2021, Ghana's higher education system had expanded to include 15 public universities, four chartered private universities, 81 private tertiary institutions, 10 technical universities, one distance-learning institution, 45 colleges of education and 29 training colleges. Student enrollment has also dramatically increased over the years. In 2021 2 649 PhD students were admitted at the University of Ghana with a total of 6 380 currently registered, and a total of 646 graduated². There is still a fervent push to accelerate other milestones like research production, and further improve doctoral training.

Higher education in Ghana was historically regulated by two agencies: The National Council for Tertiary Education (NCTE), which has financial obligations for tertiary education, and the National Accreditation Board (NAB), which sets accreditation guidelines and requirements for institutions to meet to be granted accreditation (Alabi and Mohammed,2018). In 2019, the two entities were merged under one umbrella body through the new Education Regulatory Bodies Act

2020 (Act 1023), to form the Ghana Tertiary Education Commission (GTEC)⁵. The Act was given presidential assent on 21 August 2020, paving way for the Governing Board to be appointed and inaugurated on 25 November 2020.

Generally, PhD programmes in the country have been instituted to align with the national development vision and institutional missions, strategic plans, and available qualified staff and faculty. There has been a national policy reform since 2013 that all university lecturers must have a PhD as the minimum entry requirement for a faculty position⁶. All these reforms have resulted in an upward trend in the enrolment of students in universities across the country (Fig. 3). As can be seen, the system has expanded fivefold from just over 100 000 students in 2005 to approximately 550 000 as of 2020.

Figure 3: Number of students enrolled in tertiary education in Ghana from 2005 to 2020



2.3 The context for PhD in Ghana

Typically, the PhD programme in Ghana is four years in duration. There is a generic module of having coursework examined after either, the first and only, or both the first and second year, with the subsequent two years dedicated to the research component of the programme. Respective academic departments provide detailed information about the structure of programmes, advice and

⁵ <https://gtec.edu.gh/about-us>

⁶ <https://gtec.edu.gh/about-us>

counselling to students, which leads to the awarding of a PhD.. The PhD candidates are either directly allocated to supervisors, or potential students can directly contact interested faculty for expression of interest to work with them. All supervisors of doctoral candidates must be accredited by the Board of Graduate Studies, which also sets out specific requirements of the make-up of the supervisory committee.⁷ Generally, candidates are required to have either a first or second-class degree, or a relevant master's degree, to apply for admission. Additional requirements might include:

1. Satisfactory amounts of financial support to cater for fees and the necessary requirements.
2. Meeting further admission prerequisites of the specific academic programme⁸.
3. Meeting further admission requirements if the candidate only has an undergraduate qualification⁹

Applications for doctoral degrees are generally accepted within a specific period, usually between May and August, but this has changed since the COVID-19 pandemic. The semester begins a month or two after successful applicants have been accepted in the programme. Successful applicants are also supposed to indicate whether they will be enrolled on a full-time or part-time basis. The normal duration for the completion of a doctoral degree programme as a full-time student is four years and six years for part-time¹⁰. A PhD student must satisfy the following requirements to attain between 75 and 81 credits to be eligible for graduation: Coursework (18 – 24 credits), four seminars (three credits each totaling 12 credits), thesis (45 credits), Total - 75 – 81 credits. There are no options for distance or online education at the doctoral level in Ghana.

A comprehensive study was undertaken at the University of Cape Coast (UCC) in Ghana from 2010 to 2019 to understand the research liminalities and rate of PhD student graduation at the university. This is a good representation of the general experience in Ghana. Figure four below is

⁷ The supervisory committee must be made up of only holders of doctoral degrees or faculty of professorial rank, and at least two members of the committee must be of a rank not below Senior Lecturer.

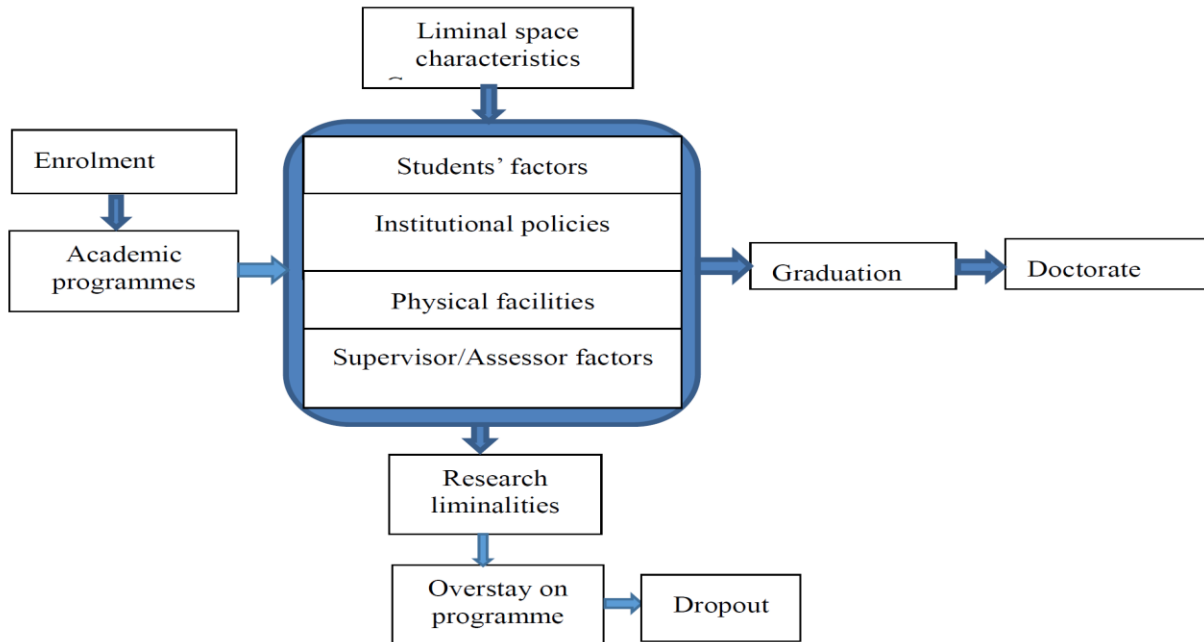
⁸ These may include evidence of passing certain required courses at the undergraduate or masters levels on their transcripts.

⁹ Conditional admission letters will be provided by the School of Graduate Studies to facilitate the taking of prerequisite courses (Level 600 courses) in the first year, upon which candidates will progress into PhD. Those who are unable, will undertake an MPhil thesis research and on completion, will be awarded an MPhil degree. Candidates who progress into PhD will be given conditional admission into the PhD program. They shall take Level 700 courses and continue to fulfill the requirements for graduation.

¹⁰ A PhD student who cannot complete in time may apply for extension of studentship and may be granted approval for periods not exceeding 2 years for full-time and 1 year for part-time programs.

a summary of the findings of the mixed method study, and it explains the environment that the typical PhD student might encounter during their programme.

Figure 4: A journey into doctoral degree in the scholarly community



Source: Nyagome and Milledzi, (2020)

Generally, it was observed that at the UCC, the doctoral research and thesis tasks were not well defined, and this could result in some loss of focus by the PhD student. It was identified from the study that the lack of commitment of supervisors to the direct monitoring and guiding of the PhD students was the major contributing factor to delayed graduation rates. This assertion is true in many universities in Ghana. In this regard, clearer structures around the responsibilities and commitments from each party to the PhD programme could greatly assist throughput. The growing trend in other countries towards Memoranda of Understanding or contracts being implemented between the PhD candidate and his or her supervisor/s, might address this challenge in the Ghanaian context. A more formalised structure is already emerging as critical, even in the cases evaluated in this report. In the two programmes discussed in this report, it is evident that the successes in the programmes are directly related to the team supervision style, where multidisciplinary faculty form part of the PhD supervisory committee, and there is the requirement of progress reports by PhD students throughout their programme.

3. The University of Ghana and study focus

3.1 Overview of the University of Ghana

The University of Ghana is the premier and largest university in Ghana. Founded in 1948 as the University College of the Gold Coast, its primary purpose was to provide and promote tertiary education, learning and research for Ghana and beyond. The university has since then positioned itself to provide distinguished research that impacts national health and developmental interests. This is aligned to its vision is to become a “world class” research-intensive university over the next decade. The university’s mission is to create an enabling environment that makes it increasingly relevant to national and global development through cutting-edge research, as well as providing high-quality teaching and learning. To achieve this mission, the university abides by four core values: integrity, commitment, respect and loyalty.

At the University of Ghana, the School of Graduate Studies coordinates all PhD studies, and is headed by a Dean, assisted by a Vice-Dean and an Executive Secretary. The school is responsible for graduate admissions, registration and orientation, student records, approval of thesis/dissertation supervisors and examiners, thesis/dissertation topics, examination of theses/dissertations, accommodation for graduate students, processing of applications for government bursaries/grants, as well as approval of results and graduation. The school is supported by a board, comprising three sub-committees:

1. The Graduate Programmes Development and Admissions Committee, that has substantive responsibility for the content of current and new programmes¹¹.
2. The Graduate Examinations Committee, which has oversight responsibility for examination.
3. The PhD Technical Committee, which supports the implementation of the four-year programme.

All PhD candidates admitted to the University of Ghana are required to spend six to 12 months during the second year in their PhD in an experiential learning programme. Each student must be attached to a research laboratory/ industry for their experiential learning. The experiential learning period gives students the opportunity to learn research techniques in a practical setting. This period

¹¹ <https://sgs.ug.edu.gh/mission-vision>

could also be used to develop protocols, optimise methods, or collect preliminary data on their research. Students must submit a written report of their laboratory attachment or field work, and also present a seminar. Students will have the option to work on some of the ongoing research projects being led by faculty members and their international collaborators.

A comprehensive examination must be completed within eight weeks of the commencement of the first semester of year two of the student's PhD programme. Departments must organise comprehensive examinations for each doctoral student after successfully completing course work, and students are required to pass the comprehensive examination¹² before proceeding to the next level. All examiners appointed must be PhD holders and shall not be below the rank of a senior lecturer.

Thesis disciplines, names, and addresses of supervisors must be recommended by the departmental Graduate Studies Committee and be submitted before the commencement of the programme to the School and College Boards. The final thesis details must be submitted to the Board of Graduate Studies by the beginning of the second semester in the year of completion for approval. All examiners of doctoral students must be accredited. A PhD thesis, prepared and presented for examination, must showcase the ability of the candidate to conceive and conduct independent research, as well as their skills in organising and presenting findings on a topic in a specific field. The thesis format must comply with the guidelines for preparing a graduate thesis. Article-style theses will also be accepted for doctoral candidates whose completed thesis consists of journal-style manuscripts or articles.

The Board of Graduate Studies reviews the recommendations of the examiners and supports the passing or failing of the degree in accordance with specific requirements.¹³

¹² This consists of three components: a written examination, submission of a review paper or research proposal; and an oral examination.

¹³ Where all three (3) examiners pass the thesis and the oral examination, the Board must decide to pass it, subject to corrections; if a doctoral thesis is failed or referred by one of the three (3) examiners, the Board must review the nature of the fail or referral grade and decide either to pass, refer or fail the thesis; a doctoral thesis referred by two (2) or more examiners shall be referred. A doctoral thesis failed by two or more examiners shall fail.

3.2 Recap of research focus and objectives

The overarching objective of this research report is to respond to ARUA's objective to create globally competitive collaborative PhD programmes among ARUA member universities. More specifically, the research seeks to identify selected PhD programmes at ARUA member universities, review the programmes, and make recommendations to ARUA towards better collaboration across the alliance. Two PhD programmes were selected from each university; one from the humanities, and one from the natural sciences. Data was collected from each of the programme coordinators or head of programmes (Appendix 3). Institutional data was further collected from the institutional websites and personal interactions with heads of departments and faculty representatives. These were analysed according to three main themes: (1) access to the programmes, (2) structure of the programme, and (3) experience through the programme. The research further sought to conduct interviews with the Vice-Chancellor of each university to gain inputs into four main issues related to collaboration: (1) national and institutional policy, (2) current collaboration practice, (3) challenges facing collaboration, and (4) recommendations for better collaboration. The University of Ghana was included as the sample institution to be studied in the project. However, the PhD programmes from the university were selected through a negotiated approach between the research team and the university. While a set of criteria was proposed, the university had the discretion to suggest a preferred programme from the humanities and another from the natural sciences. Two programmes were selected for detailed review. These are the Doctor of Philosophy in Biochemistry/Molecular Cell Biology of Infectious Diseases, and the Doctor of Philosophy in Development Economics.

3.3 The case study programmes

Department of Biochemistry, Cell and Molecular Biology (BCMB): Doctor of Philosophy in Biochemistry/ Molecular Cell Biology of Infectious Diseases

The department was established in 1963 as Biochemistry, Nutrition and Food Science, and later, in 1970, as a stand-alone department of Biochemistry.. In 2014, the West African Centre for Cell Biology of Infectious Pathogens (WACCBIP) was established with funding from the Government of Ghana under the World Bank's African Centers of Excellence (ACE) in Higher Education Project. The WACCBIP is led by faculty from the Department of Biochemistry, Cell and Molecular Biology (BCMB), the Noguchi Memorial Institute for Medical Research (NMIMR), the

University of Ghana, as well as many other international collaborators from other African, European and American universities and institutions. Since the establishment of the WACCBIP, infectious disease research is at the forefront of most research efforts. The faculty have found innovative ways to integrate their areas of research to understanding and positively contributing to infectious diseases of national importance, as well as training the next generation of scientists (Table 3). The WACCBIP has received a full five-year International Advanced Degree Accreditation from the Royal Society of Biology (RSoB) for its MPhil and PhD programmes in Molecular Cell Biology of Infectious Diseases.

Currently, the research themes within the PhD in Biochemistry/ Molecular Cell Biology of Infectious Diseases fall under four major categories:

1. Biochemistry of natural products: plant and fungal products and applications in health and industry.
2. Molecular genetics: application of molecular techniques in the study of microbial biodiversity.
3. DNA barcoding of plants and animals; infectious diseases: mechanisms of disease and discovery of molecular targets and agents for therapeutic interventions.
4. Applied microbiology and biotechnology: bioremediation, biotransformation in biofuels, and animal feed.

Table 2: Total PhDs awarded by the biochemistry department UG (2015 to 2021)

Department		2015	2016	2017	2018	2019	2020	2021	Total
Biochemistry	Admitted	18	22	14	13	13	18	6	104
	Registered	15	29	37	49	58	59	40	287
	Graduated					4	10		14

Department of Economics: Doctor of Philosophy in Development Economics

The Department of Economics was established in 1948 and is one of the teaching and research departments under the Faculty of Social Studies. The department offers undergraduate, graduate and doctorate degrees in economics and a Master of Arts (MA) in Economic Policy Management. The department also services other departments/establishments of the university, namely, the College of Agriculture and Consumer Sciences, the University of Ghana City Campus, the Legon Centre for International Affairs, the Regional Institute for Population Studies, and the Institute of Continuing and Distance Education. Since its establishment, the Department has produced eminent and distinguished professionals at international and national levels, both in government, and within the private sector. As shown on table 4 below the is a comparative low number of graduations relative to the enrolments or registrations with less than 7% of enrolments from the last six years graduating.

Table 3: Total PhDs awarded by the Economics department UG (2015 to 2021)

Department		2015	2016	2017	2018	2019	2020	2021	Total
Economics	Admitted	12	5	10	6	1	8	7	49
	Registered	20	23	28	33	26	24	23	177
	Graduated					6	6		12

The table below provides a summary of the data collected from the two programmes head of programmes or research office.

Table 4: An overview of data collected from the two PhD programmes

	PhD in Development Economics	PhD in Biochemistry/ Molecular Cell Biology of Infectious Diseases
Name of programme	PhD in Economics (Development Economics)	PhD in Biochemistry/ Molecular Cell Biology of Infectious Diseases
Entry requirement	An MPhil or two years of MA in economics or any quantitative course.	<ul style="list-style-type: none"> • Relevant master’s degree from the University of Ghana or any accredited university. • A recognised first degree is required to take a first-year courses of level 600 master’s programme
Last five-year enrolment / graduations	32 enrolments and 12 graduations.	64 enrolments and 27 graduations
Application process (open application, supervisor route, or funder calls or interviews)	<ul style="list-style-type: none"> • Open applications and supervisor route. • Transcripts are requested alongside a PhD proposal, CV, and an official entrance examination. • Admissions are granted based on examination performance and other requirements. • US\$110 application fee. 	<ul style="list-style-type: none"> • Open applications and supervisor route. • Transcripts are requested, a PhD proposal, CV, and an official entrance examination. • Admissions are granted based on examination performance and other requirements.
Start and end date month	According to the university calendar.	According to the university calendar.
Programme cost	<ul style="list-style-type: none"> • International students: US\$12 000 per year for four years. • Ghanaian students: GHS12 000 per year for four years. 	<ul style="list-style-type: none"> • International students: US\$12 000 per year for four years, Ghanaian students: GHS12 000 per year for four years.
Credit system	Follows University of Ghana PhD policies.	Follows University of Ghana PhD policies.
Duration of programme	Four years	Four years
Registration process	Follows University of Ghana PhD policies.	Follows University of Ghana PhD policies

Course design	One year taught course, followed by three years of thesis writing after passing comprehensive examinations.	<ul style="list-style-type: none"> • One year taught course, followed by three years of thesis writing after passing comprehensive examinations. • Up to six months working with collaborator universities doing research work.
Supervisory model	One student with several supervisors (team supervision model).	One student with several supervisors (team supervision model).
Collaborative	<ul style="list-style-type: none"> • It used to be a collaborative programme with the United Nations University – World, Department of Economics and Institute for Development Economics Research but not anymore, due to funding reasons. • Joint cohort research days with ISSER. 	<ul style="list-style-type: none"> • Department of Biochemistry in collaboration with the West African Center for Cell Biology of Infectious Pathogens. • Several international universities in the UK, USA, Kenya, South Africa, Gambia, Mali, Burkina Faso, Cote d’Ivoire.
Quality of staff (% PhD/ professors)	25 PhD holders and one MPhil with Nine professorial; 11 senior lecturers; and five lecturers.	28 PhD holders: 14 BCMB; eight WACCBIP; six NMIMR with six professorial; three senior research fellows; four senior lecturers; five research fellows; and –four lecturers.
Quality of infrastructure	<ul style="list-style-type: none"> • The school library, ICT support from UGCS, School Research hub. • There is no programme specific infrastructure. 	<ul style="list-style-type: none"> • School and department library, ICT support from school and department, well equipped research laboratories. • Fellows Common Room for students to sit and work with unlimited internet access. • Science technology platforms.
Programme support	Candidates solely fund their programme due to the unavailability of programme funds.	Candidates are at liberty to apply for scholarship opportunities. However, the selection process for scholarships is competitive because it covers all four years of their study.
Programme highlight	<ul style="list-style-type: none"> • Alumni mostly return as lecturers and professors. • Scholarships for some students (especially female candidates). • Visiting professors teaching in the programme 	<ul style="list-style-type: none"> • Noteworthy contributions to the research world in AMR, COVID-19, malaria and immunology. • Visiting professors teaching in the programme.

Compulsory components	Compulsory course work, minimum lab work.	Compulsory orientation, compulsory course work, minimum lab work, seminar attendance.
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4. Emerging findings from the data

The findings from the data are presented along three broad themes of access to the PhD programmes, the structure of the programmes and the experience of students through the programme. The study explores these three aspects and how they affect quality, graduate outputs but more relevant to this study is potential collaboration with other member universities.

4.1 Findings linked to Programme access

Applicants to the BCMB programme are encouraged to submit their applications as early as possible on the university application portal and are responsible for ensuring that all admissions documents are uploaded on time. The application is then forwarded to the department for further processing. There is separate application for financial support at the BCMB/WACCBIP, and support depends on the graduate programme applied for by an applicant. The department is the teaching and degree awarding unit. The centre developed the PhD programme accompanied by the financial structure to support PhD candidates. The selection process for admission into a graduate programme at the BCMB and WACCBIP occurs in two parts: a two-hour written examination, and a 20 to 30 min interview. Only successful candidates of the written examination are invited for an interview. Admission is based on the cumulative score of the written examination and the interview. International applicants participate virtually in the interviews.

The PhD in Development Economics is a collaborative programme between the University of Ghana (UG), and the United Nations University-World Institute for Development Economics Research (UNU-WIDER). Interested applicants in the PhD in Development Economics programme must hold a master's degree in economics or a related field. The applicant must have undertaken a year's coursework at the MPhil level or its equivalent with at least a B+ average in micro, macro and quantitative methods. A limited number of students, especially females, who are admitted into the programme, may be granted scholarships that are renewable annually, up to a maximum of three years, depending on the candidate's academic performance. Additionally, successful applicants will undertake an internship of up to three months at the UNU-WIDER in Helsinki during the second year of their training. During this internship, of which the cost is covered by the UNU-WIDER, students will analyse project-related datasets. Female applicants, and those from the West African sub-region, are highly encouraged to apply.

There is a non-refundable application fee of US\$110 or its equivalent, and applicants must, in addition, submit the following documents:

1. Copies of certificate(s) authenticated by institution(s) awarding their degree(s).
2. Copies of university transcript(s) authenticated by institution(s) awarding their academic results.
3. Referee reports (two must be from person(s) who are familiar with the applicant's academic work, one of whom should be the applicant's graduate supervisor or the head of the department of the institution where the student obtained his/her graduate degree).
4. A research proposal (maximum 10 pages).
5. A CV highlighting academic and work experiences.

4.2 Programme structure

The duration of the BCMB programme is four years, and it is offered on a full-time basis. The programme comprises two semesters of course work; a PhD qualifying examination; one proposal seminar; three progress seminars; and one thesis defence seminar (PhD viva). All activities of the programme are assessed and graded. While students are encouraged to complete the PhD in four years, completion time may vary based on students' progress on thesis research. Students are required to obtain a grade of at least a C. Students will be withdrawn from the programme if this requirement is not achieved.

The PhD programme in Development Economics is a collaboration between the Department of Economics and Institute of Statistical, Social and Economic Research (ISSER) which started in 2016. The duration of the programme is four years, and it is offered on full-time basis. It consists of a year of coursework, followed immediately by a comprehensive examination, and three years of thesis writing. The first year is devoted to coursework. The core courses include, applied econometrics, advanced macroeconomics, advanced microeconomics, applied theories, and methods of economic development. The elective courses are, applied natural resource economics, applied agricultural economics, applied health economics, advanced international economics, advanced monetary economics, advanced labour economics, and political economy of African

development. Part of the four-year programme is devoted to writing a dissertation on topics in development economics.

4.3 Programme experience

In the BCMB programme, the department's Graduate Studies Committee (GSC) assigns students to supervisors based on the mutual research interest between the academic and the student. In a special situation where a student has already approached a faculty member on a particular research project, the student can suggest the faculty member to the departmental GSC, and a discussion will be held with the faculty member, and a supervisor will be assigned accordingly. It is advised that students must work with the supervisor to arrive at an acceptable research topic. In addition, a student will be assigned a mentor, who is usually a faculty member other than the student's main supervisor.

The student thesis advisory committee (STAC) must consist of the main supervisor and two or three other academics as co-supervisors. Throughout the programme the student will report to his/her STAC via written reports and annual meetings (oral presentation). It is the responsibility of the student to organise the annual meetings and then submit the minutes of the meeting to the departmental GSC a week after the meeting.

The department organises comprehensive examinations for each doctoral student after successfully completing the course work. The comprehensive examination is made up of three components:

1. A written examination consisting of questions related to all the courses taken during the first year of the PhD programme as well as general cell and molecular biology. Material covered in departmental seminars and workshops may also be included.
2. A research proposal: this should be in the general area of interest of the PhD candidate. The proposal should be different from the candidate's thesis research proposal.
3. An oral examination: the PhD candidate is required to make an oral presentation of the submitted research proposal by power point and answer questions on the proposal and related areas.

Each component of the examination is scored separately. A student must score 60% in each component to pass the examination. These individual components of the comprehensive

examination have a significant positive impact on the quality of the PhD programme. The written examination has a wide scope that covers all the courses taken in the first year. The rigour of writing the research proposal, as well as preparing and delivering the oral exam, is seen as enhancing critical thinking skills and building confidence in the student's ability to undertake independent research.

The Development Economics programme had about 31 students between 2014 and 2021, of which 11 were females including two international students (Table 4). Ten students were admitted in the first and second years, respectively; six students were admitted in the third year, and seven were admitted in 2021. Of the total number of students admitted, 19 were scholarships (50% of the first and second cohorts, 67% of the third cohort, and 71% of the last cohort).

The three attractions of the programme are:

1. Scholarships for some students (especially female candidates).
2. Visiting professors teaching in the programme.
3. The University of Ghana is a premier university within the sub-region and ranked the seventh best in Africa according to the recent Times Higher Education rankings¹⁴

As of 2022, it is no longer a collaborative programme, due to withdrawal of funds / lack of funding. The cost of tuition, research costs, and living expenses are what contribute to the high cost of the programme. Also, it is desirable that part of the programme is undertaken in either, a regional or international collaborating institution, as part of exposure and training. Mobility costs to facilitate this experiential learning are very high, and not easily affordable by self-funded students.

¹⁴ <https://coh.ug.edu.gh/news/university-ghana-hits-7th-position-best-universities-africa>

5. Implications for collaboration

Three key factors could be attributed to the successful collaboration of the case study programmes at the University of Ghana. These relate to the availability of resources, the quality of the programmes and the structure of the programmes.

5.1 Attributes enhancing collaboration

5.1.1 Availability of resources

There is improved access to research facilities across collaborating institutions where PhD students can undertake short visits to accomplish some of their research objectives. This also enhances cross talk between academic supervisory teams for better quality of research projects. Additionally, external collaborators, who have easy access to reagents and consumables, can facilitate the acquisition of these items for students in a timely manner for onward completion of their research projects.

5.1.2 Programme quality

Due to the successes of both students and faculty in the two departments, there is an increase in the quality of the PhD programme, both in outputs and in the programme experience. This serves as a positive factor during application for more competitive funding opportunities. Funders are more likely to finance and be associated with programmes that are productive. The availability of resources, to pay for fees and cover research or other mobility costs, improves the overall quality of the PhD programme in terms of support for both faculty and students. There is also a direct improvement of the facilities by way of advanced equipment and physical space to enhance research and training within the larger university space and increases the visibility of the university as a research-intensive institution. All these efforts increase the rate of graduation and the number of graduates produced.

5.1.3 Programme structure

The inclusion of inter/multi and transdisciplinary concepts during team supervision of PhD students generally encourages diversity and brings quality to the structure of the programme. Learnings of best practices from other universities – international and regional – have informed the mandatory year-long course work and experiential learning components of the PhD programme at the University of Ghana.

5.2 Constraints to collaboration

Challenges pertaining to collaboration have been captured by these three points:

5.2.1 Inconsistency across programmes

There are *different requirements for what a good PhD is* and the duration of each programme. This poses a challenge to the successful mobility of PhD students across African institutions because courses, and or grades, might not be transferable from one institution to another. There are also differences in profiles of PhD students across countries and specific programmes, ranging from age to experience. For the sciences in the University of Ghana, the option of being a part-time PhD student is rare, however, this seems to be the preferred mode in the University of Lagos, Nigeria. This means that the timelines to meeting progress differ across these institutions, and this can hinder the collaborative mobility envisioned by ARUA.

5.2.2 Inadequate support across

Every country is encouraged to *make their tertiary education more inclusive* along the lines of race, religion, gender, financial support etc. Engaging everyone brings more opportunities for collaborative efforts across the world, including funding. This is a challenge because not all universities have the same support systems and financial resources to ensure there is inclusivity to access, structure and experience. In the USA, there is the “ivy league” classification of some universities due to their infrastructure, financial resources, and human resources, which allows these universities to produce PhD outputs of high quality and numbers. There are other state and smaller universities which do not have the same advantages. These disparities result in a higher proportion of students seeking enrolment in the “ivy league” institutions compared to the others. This same observation is mirrored in most African countries where the best students only seek entry into the universities with higher achievements and support systems.

5.2.3 Regulatory challenges

There are *regulatory challenges across the board (both within the country and across countries)* that can negatively hinder progress to harmonisation. This cuts across examinations, selection of supervisors and their training, as well as mentoring practices. The varying supervisory styles and formats can be streamlined by selecting the team supervision from the University of Ghana presented in this study.

The team supervision adopted at the university of Ghana is excellent at multi and interdisciplinary training. It would be further improved if more faculty across universities in Africa can contribute to the global training of PhDs in different institutions.

6. Recommendations for collaborative PhD programmes

The recommendations are presented along three main levels: national, institutional and programme level.

6.1 National level:

6.1.1 Policy review to better facilitate collaboration toward qualifications

The political systems of the country should intensify their efforts to attract external collaborations. This involves an immense commitment by governments to institute research funds which both, faculty and graduate students, can apply to undertake research of national importance. These funds can be raised by the contribution of a percentage of the GDP to graduate education, or by implementing policies that require pharmaceutical companies and other industries that have a component of research and development to support the training of graduate students for future employment purposes. Ensuring that the programmes are more inclusive, and not tribalistic or racial, as mentioned earlier, could foster collaborative PhD programmes. In this context, inclusiveness implies that students from diverse backgrounds would all have the same opportunity to study at the best universities across Africa.

6.2 Institutional level:

6.2.1 Institute formal support structures for supervisors and students

The support for supervisors and mentors during PhD training must be encouraged. At the WACCBIP, there is a dedicated mentorship coordinator who assigns each graduate student to a faculty mentor. This relationship is primarily for support outside of the academic space in order to groom students to become well-rounded and independent researchers who can balance life challenges and manage time well. The mentorship coordinator also serves as a liaison between students and supervisors, and intervenes when there are difficulties in that relationship that could adversely affect the progress of the PhD work. The qualification of faculty members who can serve as supervisors has to be structured. At the University of Ghana, a supervisor for a PhD student has to be either of senior lecture or professorial ranking. This differs across universities in Africa. Learnings from other countries suggest that it is technically best for senior lecturers and professors

to serve as supervisors as they have the necessary maturity and experience to provide the right support to students.

6.2.2 The formation of research teams across universities to initiate collaboration

There is a need to form research teams across universities to foster collaborative efforts especially in absorbing equipment cost and usage maintenance. ARUA can identify research units across its member universities, identifying which universities can acquire, run and maintain core equipment as a fee service enterprise. This can in turn be used in funding the huge maintenance costs that are associated with their usage. In this way, individual institutions do not have to bear this burden of research grants or other sources of internally generated funds. Establishment of research teams across ARUA universities also increases the pool of accredited potential thesis examiners who can assist in the grading of thesis in the timely manner and contribute to the supervision of graduate students.

6.3 Programme level

6.3.1 “Back-pack” programmes as a way to improve student experience and quality

The BCMB/WACCBIP programme has a six-month “back-pack” programme that allows students to visit a collaborating lab to undertake a fully funded period of research. This accelerates the rate of completion of the programme and creates opportunities for further research/postdoctoral opportunities for students. It will be helpful if ARUA can secure some funding to integrate this as a programme across ARUA universities. It could serve as an example to other natural sciences departments across ARUA universities as they try to institute collaborative PhD programmes. To do this, faculties with research labs that have specific infrastructure, can be identified to serve as sites for either experiential learning, or sites with a core set of scientific technology platforms for undertaking research. PhD students can then apply for the funding provided by ARUA to facilitate their mobility for six months to undertake their research in a timely manner. The duration can vary based on the amount of funding required and the quality of the research being undertaken. Outputs of the final PhD, in the form of manuscripts, can include authorship and/or acknowledgement of the collaborating institution. Additionally, the experience of this process that the student has been exposed to, broadens their academic endeavour, and allows for further development of the research

topic, data analysis, and interpretation for quality outputs. This could be piloted at ARUA Centres of Excellence and then expanded across collaborative programmes.

6.3.2 Including soft skills training in the structure of the programmes

Soft skills training, possibly organised by the doctoral schools within the universities, should be introduced. The majority of the PhD training at African universities do not have a structured course work component. As part of the efforts to produce well-rounded PhDs, it is recommended to consider the inclusion of a component of soft skills training. In this regard, doctoral degree holders will build the necessary confidence required for networking and entrepreneurship.

6.3.3 Introduce coursework in the doctoral programmes

The one-year course work is crucial and thoroughly beneficial to the quality of the PhD. The course work places all enrolled students on the same didactic scale at the end of year one. It also serves as a test for the ability to survive in the PhD programme as the scope of the courses taught gives an indication of what is truly expected from a PhD student. The taught component also provides additional support to PhD candidates who might venture into academia where they are required to teach.

6.3.4 Formal reporting and feedback mechanisms must form part of the structure

The development and insistence on the use of structure in PhD programme is vital. For example, there could be the use of regular reporting forms to track progress of students as well as the setting standards across board for monitoring progress. These have to be done early in the programme. At the University of Ghana, the average PhD student must deliver four progress reports as an oral presentation to the entire department, which are graded and contribute towards the awarding of a doctoral degree. Thereby, the student's progress can be monitored, and the research study can be further improved or moulded, by suggestions and comments raised by faculty and other students during the presentation. This is an excellent way to encourage hard work and timeliness in the duration and completion of a PhD.

6.3.5 Introduce team supervision of students versus the apprentice model

Team supervision with formal and structured feedback to students can be introduced. The University of Ghana practices team supervision for graduate degrees. Feedback given during

structured and scheduled supervisory committee meetings is readily incorporated into the execution of the research. In this regard, faculty members with various expertise, are included in the progress of the research study for quality outputs. These contribute significantly to the general population's understanding of the long-term goals of tertiary education and encourage people to want to further their studies.

6.4 Conclusion

Ghana has made massive growth efforts in the tertiary education sector. However, despite these efforts, the country is still lacking, especially in funding for higher education and for doctoral training. The inadequacy of funds appears to have been the general challenge observed in the study. The government and institutions are hereby encouraged to seek external funds to support doctoral throughput and enhance collaboration with member universities. Creating the right policy environment at the national and institutional level would also support the initiatives of organisations such as ARUA and other regional internationalisation initiatives.

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Appendix: Data gathering instrument

African Research Universities Alliance (ARUA)

Data Collection Instrument: Doctoral Degree Programme

Towards a Collaborative PhD Program across ARUA member universities
in the Natural Sciences and the Humanities and Social Science Disciplines

Compiled by [Name of researcher(s)]

Please note: This data collection instrument must be completed for every programme separately. [One for the natural science programme and another for the Humanities /social science programme]

- a. Name of the university where the degree is offered

Programme-specific information:

- b. Name of the faculty/school and department/centre/institute where the degree is offered
- c. Exact name of the degree programme and qualification
- d. Number of credits (total; elements)
- e. Number of students/candidates enrolled in the degree programme over the last 5 years (number of enrolled PhDs)
- f. Academic staff available for supervision / staff to student ratio
- g. Qualification of staff (% PhD, % professors)
- h. Graduation number in the degree programme over the last 5 years
- i. Availability of supporting infrastructure, including institution-wide infrastructure (library; ICT support; statistics support; research hub; writing centres etc.); faculty-wide infrastructure / department / centre (e.g. laboratories, studios, postgraduate academies); and programme specific infrastructure (if any).
- j. Is this a collaborative programme (with another institute/university)? If yes, please elaborate on any relevant aspect.
- k. What is the history of this programme? (date started, how it might have changed with time)
- l. What makes this programme one of the best? Any notable graduates, ranking achievements, patents or so (or other 'bragging rights' or significant achievements or recognitions worth mentioning)?

Admission requirements

- m. Minimum prior qualification plus other requirements (e.g. masters GPA or score average points/merits; work experience; professional registration, or the like)
- n. Application date & start date of programme (deadlines)
- o. Formal application procedure and requirements for supporting documents (e.g. PhD proposal; CV; sample writing; etc.)
- p. Contacting and assignment of supervisor(s)

- q. Please comment: Are these admission requirements typical for all doctoral programmes nationally, in this institution, or are they specific to the HUM or STEM, or are they unique to this particular programme?

Structure and content of programme

- r. Assignment of supervisor and supervision model
- i. one student-one supervisor (traditional / apprenticeship model);
 - ii. one student-several supervisors (team supervision model);
 - iii. many students-several supervisors (cohort supervision)
 - iv. is there a contract between supervisor and student?
- s. Collaborative supervision aspects and other research support (e.g. joint cohort research days; postgraduate academies; etc.)
- t. Provisional vs. full registration rules e.g. Is there a period when one is provisionally admitted pending some procedures? such as proposal presentation and acceptance, title registration;

Programme requirements:

- u. Compulsory elements (e.g. compulsory orientation; compulsory course work; minimum lab work; seminar attendance; residency requirements; professional work/internship requirement; field work requirements;)
- v. Other elements, e.g. exchange programmes
- w. Milestones and outputs of the programme:
- i. Requirement to present (inhouse or at a conference)
 - ii. Requirement to publish (type and number of minimum publications)
 - iii. Thesis by monograph, by professional capstone, by articles (explain all in detail)
- x. Duration of the programme: Minimum time to graduation; maximum time to graduation
- y. Financial obligations and benefits
- z. Costs of the programme (per annum; overall)
- aa. Funding opportunities: availability of sponsorship, bursaries, scholarships, assistantships; tutoring/lecturing; etc.
- bb. Conference attendance (e.g. availability of sponsorship)

Assessment of this programme

- cc. Please comment: Is this structure and content of the programme typical for all doctoral programmes in this institution, or are they specific to the HUM or STEM, or are they unique to this particular programme?
- dd. Please comment on the programme's comparability with other doctoral programmes you are familiar with.
- ee. Please comment on best practices or the need to modify.
- ff. What could be done to make the programme more harmonized with others within ARUA universities.

Please use the reporting tool to collect and compile additional information on (1) the country and national higher education system; (2) doctoral degree rules (national) in the country and related information; (3) the institutional background (university).

