

## Description of RUFORUM Regional Post-Graduate Degree Programmes

### Rationale

RUFORUM supported regional MSc and PhD programmes are designed in response to specific capacity gaps within the realm of agriculture in Eastern, Central and Southern Africa and in support of the Comprehensive Africa Agricultural Development Programme (CAADP). Specifically the regional programmes are designed to address the following needs:

- i. The need to build the teaching and research capacity of member universities in order to strengthen undergraduate and MSc programmes and improve the quality and relevance of graduates.
- ii. The need to enhance capacity for training and research that targets improving food and nutrition security and access to knowledge.
- iii. The need to pool and rationalize the use of scarce resources and expertise for joint action towards improving the livelihoods of farmers in Africa.

The approach is grounded in the recognition of the importance of training doctoral students in Africa, while offering opportunity for international exposure. This approach allows for five students to be trained in Africa for the same cost of training one student abroad. It means that the research can be carried out in ways that directly benefit surrounding communities and the African agenda, and it also provides an opportunity for mature students to be able to upgrade their qualifications while in-service. The severe shortage of high-level skills means that universities, research centres and other agencies cannot afford to release staff for the 5 years required for international study.

### PhD in Plant Breeding and Biotechnology at Makerere University (MUK), Uganda

Investing in plant breeding is a matter of urgency because of the diverse needs of the Africa's farming community and persistent poverty and food insecurity. All National Poverty Reduction Strategy Papers advocate for increased development and use of science and technology to address the continent's persistent hunger and poverty. At a global level, the Food and Agricultural Organization of the United Nations points out to the very limited capacity of especially high level trained plant breeders particularly in sub-Saharan Africa. This has led to limited variety releases and generally weakened innovation systems, which are critical for enhancing productivity to address food insecurity and livelihood issues. The goal of this 3 year training programme is to develop and strengthen the human resource and research capacity for crop improvement and related development areas in sub-Saharan Africa but with particular emphasis on Eastern, Central, Southern and West Africa countries. The programme aims at giving graduates an opportunity to broaden and deepen their knowledge in Plant Breeding and Biotechnology that will enable them to effectively and efficiently engage in science-led agricultural development and to strategically

invest in the building of strong national-regional–global consortia to support and develop (where non-existent) PhD training programmes built on shared and rationalized regional resources for a strong agricultural science and innovative base. Graduates from the programme will be characterized by competences within basic sciences, applied science and ethics and values. The detailed curriculum is available at <http://repository.ruforum.org/documents/phd-plant-breeding-and-biotechnology>

### **PhD in Dryland Resource Management at University of Nairobi, Nairobi, Kenya**

The 3 year programme is responding to the need for strategic interventions on research for development that enhances security of dryland livelihoods, and to build capacity for capacity building in dryland Africa. The programme provides a platform through which innovations are tested and weaved into solutions for problems by involving affected communities in the Eastern, Central, and Southern Africa region and beyond. The programme’s objectives are to improve the management of dryland resources by developing new technologies and capacity building at community level, and to formulate policy recommendations for supporting investments in agricultural innovation in Africa’s drylands.

The programme produces graduates who are effective and competent managers of drylands, knowledgeable in local and global scientific and development issues and the inter-linkages, leaders able to apply on the cutting knowledge coupled with hard and soft skills, within complex research and development contexts and competent in strengthening linkages and partnerships among universities in the region, and between universities and national, regional and international institutions with mandates in dryland research and capacity development. The detailed curriculum is available at <http://repository.ruforum.org/documents/phd-dryland-resource-management>

### **PhD in Soil and Water Management at Sokoine University of Agriculture (SUA), Morogoro, Tanzania**

This is a 4-year PhD programme in the fields of Integrated Soil Fertility Management, Soil Water Management and Agricultural Land Resource Planning. The main goal of this PhD programme is to develop and strengthen regional human resources and build institutional capacity in impact-oriented research in soil and water management issues. The programme is designed to produce graduates with appropriate skills and knowledge who will be able to carry out and manage agricultural research (in soil health including soil water) and dissemination and adoption (extension) of agricultural technology as part of RUFORUM Network strategic response to the Comprehensive African Agriculture Development Programme (CAADP). The graduates will be the champions of sustainable land management and reliable soil water management systems who are required to tackle the challenges of increasing and sustaining soil productivity and therefore enhancing food security. They will have capacity to synthesize and apply scientific knowledge and

skills to solve soil and water based problems in agricultural production systems, enhance capacity to develop technologies to manage soil and water resources, conduct systematic basic and applied research that is impact-oriented, addresses development paradigms, and ensures environmental sustainability and to synthesize and integrate current knowledge in soil and water sciences with existing and changing environment and livelihoods. The detailed curriculum is available at <http://repository.ruforum.org/documents/phd-soil-and-water-management>

### **PhD in Agricultural and Rural Innovations at MUK, SUA, and Egerton University, Kenya**

The 3 year programme aims at developing high-level competent professionals with interdisciplinary orientation to influence development and uptake of relevant agricultural technologies for development in Eastern, Central, Southern and West Africa. It seeks to advance the application of science and technology in agricultural and rural innovations for development. A major criticism of existing training is its being linear with disconnected disciplinary orientation that cannot appropriately address development challenges such as poverty which are complex and multi-dimensional. The overall strategy is to build capacity of the ECSA and other universities in sub-Saharan Africa to produce deeply analytical professionals to ensure their responsiveness and relevance to national development. The programme integrates academic and professional skills (soft skills) and interdisciplinary thinking to bring together different bodies of science to drive agricultural and rural development.

The PhD programme targets professionals in universities, research, extension, Non-Government Organisations and policy development institutions that need high level innovative and analytical capabilities. It is interdisciplinary by design and the learning includes engagement with real-life cases of agricultural and rural innovations. The professionals trained under this programme will assist in re-engineering the role of science and technology in rural development, agricultural innovations systems and policy development to ultimately benefit farmers.

The programme is hosted and coordinated by Makerere University, Kampala, Uganda but with degrees also offered by Sokoine University of Agriculture in Tanzania and Egerton University in Kenya. Students from the three universities take some common courses in any one of the three Universities. The detailed curriculum is available at <http://repository.ruforum.org/documents/phd-agricultural-and-rural-innovation>

### **PhD in Food Science and Nutrition at Jomo Kenyatta University of Agriculture and Technology (JKUAT) in Kenya**

The importance of food science and nutrition for health and development cannot be overemphasised. Food security and nutrition have become increasingly important areas of concern and interest internationally due to increasing world population with concurrently diminishing food security in the developing nations, increased incidences of nutrition – related diseases, the prevalence of famine, incidences of food borne diseases and safety issues. The situation calls for a fresh look at nutrition as an integral and complementary part of food science, thus, the development of a PhD program in Food Science and Nutrition. The Program covers the broad area of food Science with special emphasis on nutrition. The goal of the programme is to build, sustain and strengthen human resources capacity for teaching, learning and practice of food and nutritional sciences for development and scientific progress.

The graduates from the programme are equipped with skills and an in-depth understanding of various scientific aspects of human nutrition and food, including the composition and chemical properties of foods; nutrient functions and requirements; nutrient metabolism; physiological and biological aspects of foods and nutrients; food quality and safety; and the role of food in promoting health and the well-being of individuals and communities. The detailed programme is available at [http://repository.ruforum.org/sites/default/files/PhD\\_Food%20Science%20and%20Nutrition\\_Curriculum.pdf](http://repository.ruforum.org/sites/default/files/PhD_Food%20Science%20and%20Nutrition_Curriculum.pdf)

### **PhD in Aquaculture and Fisheries Science at Lilongwe University of Agriculture and Natural Resources (LUANAR), Malawi**

In sub-Saharan Africa, capture fisheries is important, contributing on average about 4% to GDP. There is however, a general decline in capture fisheries the world over, but more so in sub-Saharan Africa. To supplement the declining production of fish from capture fisheries, governments in sub-Saharan Africa have embarked on developing aquaculture at both smallholder and commercial levels. In southern Africa, Malawi has been mandated to co-ordinate the inland fisheries and aquaculture sectors of the region. To implement this, a state-of-the-art research and training facility was established at Bunda College in Lilongwe in 1999. The 3 year PhD Programme aims at developing and building capacity in order to support economic advancement of the Eastern, Central, Southern and West Africa region, especially the aquaculture and fisheries sector; equipping students with a deeper understanding of the theoretical framework underlying aquaculture and fisheries sciences and practices, and equipping students with skills for articulating aquaculture and fisheries issues for public and private sectors as well as strengthening regional collaboration while rationalizing the use of existing resources (human and infrastructure) in the region.

Graduates of the programme will have skills and knowledge for design and implementation of training, research and development programmes, formulation and implementation of policies relevant to sustainable use and management of natural resources, especially aquaculture and fisheries resources. The detailed curriculum is available at <http://repository.ruforum.org/documents/phd-aquaculture-and-fisheries-science>

### **PhD in Agricultural and Resource Economics at LUANAR, Malawi**

The 3 year programme is designed to meet regional as well as international demand for highly qualified and relevant professionals for planning and policy formulation in Africa. These professionals will assist in guiding policies on the critical regional problems such as food insecurity, poverty and deterioration of the environment through provision of services, teaching and training, research, outreach, consultancy and sound management. Emphasis is placed on capacity building to conduct rigorous economic analysis in response to national and regional needs.

The programme objectives are to equip students with a deeper understanding of the theoretical framework underlying economic policy decision making in social sciences, agricultural, resources and rural development areas, and with analytical skills in deriving policy prescriptions for public and private sectors, as well as, for international and non-governmental organizations.

The detailed curriculum is available at <http://repository.ruforum.org/documents/phd-agricultural-resource-economics>

### **MSc. in Research Methods at Jomo Kenyatta University of Agriculture, Kenya**

Strong research methods skills underlie effective applied science. Yet there is a decline in the number of professionals in these areas in the African NARS. Studies done by the Forum for Agricultural Research in Africa (FARA) in 2005 and the Technical Centre for Agricultural and Rural Cooperation (CTA) in 2004 pointed out that this was a major gap area in most African National Agricultural Research System, with the majority including universities, not having any Biometrician/Research methodology specialist in place to guide research. The implication is a compromised quality of research outputs in Africa. The lack of biometrician support was repeatedly mentioned by graduate students under FORUM (RUFORUM predecessor programme managed by the Rockefeller Foundation) as a major weakness in their training. The MSc. Research Methods program was launched in 2009 to respond to the identified challenges, and is housed at Jomo Kenyatta University of Agriculture and Technology in Nairobi, Kenya, on behalf of the 46 RUFORUM member Universities.

The programme's objective is to produce a new cohort of professionals able to support current multi-disciplinary research. Two main innovative features are that it is a professional training and it links methods to the context of research. The quality and reach of this initiative is enhanced through link-age to research systems in the region and use of experts from across the region including Europe. The aim is to develop a new cadre of professionals who are able to: 1. Support scientists in the planning, implementation and reporting of effective research for development. 2. Train scientists in the research methods needed to work in emerging areas. To date the programme has graduated 80 MSc students who are working across Africa. The details of the curriculum are available at <http://repository.ruforum.org/documents/masters-research-methods>.

### **MSc in Plant Breeding and Seed Systems at Makerere University, Uganda**

Strengthening Plant Breeding and Seed Systems has been identified as a priority area for increasing agricultural productivity and attaining the 6% growth in the agricultural sector as envisioned in the Comprehensive African Agricultural Development Programme (CAADP) agreed upon by African Heads of States and Governments. The process of producing improved varieties however requires a strong human resource base backed by long-term commitment to plant breeding and functional seed systems. In many countries application of biotechnology to agricultural research and production has hailed a new era. There is the promise that application of biotechnology can speed up aspects of plant breeding, although the techniques complement rather than substitute conventional plant breeding.

The MSc programme therefore aims at integrating traditional plant breeding, biotechnology and seed system approaches to increase the rate of developing new varieties and access to improved seed. It aims at training a pool of middle career professionals (MSc graduates) able to initiate and manage plant breeding programmes and with a business orientation to ensure that their products (improved seed) reach the market. The program at Makerere was launched in 2008. Subsequent cohorts of students reported in 2009, 2010, 2011, 2012 and 2014. The students come from across Africa, and the programme involves host faculty and visiting lectures from Africa, USA and Europe. The details of the curriculum are available at <http://repository.ruforum.org/documents/masters-plant-breeding-and-seed-systems>.

### **MSc. In Agricultural Information and Communication Management (AICM)**

The development of the programme was strongly supported by the findings of a training needs assessment (TNA) undertaken by RAIN in 2005. The TNA established that (i). Agricultural professionals of all cadres in the ASARECA NARS with AICM skills were very few. More specifically, agricultural researchers, educators and technologists in national agricultural research institutes, universities and extension services lacked skills to make them self-sufficient in meeting basic information needs to generate and disseminate technology. (ii). Agricultural research results are not effectively transmitted to the international research community. As a result, African concerns do not drive the international research agenda. African research is not published and does not feature in international research abstracts. (iii). Later studies established that existing university programmes did not have adequate ICT/ICM content, explaining the low ICT/ICM competency among graduates. (iv). Programmes focusing on AICM training at university level did not exist in the ECSA region, and there was even a growing recognition that ICM was an emerging a ‘new’ profession in development. The MSc. In Agricultural Information and Communication Management aims at training professionals that would support dissemination of research and knowledge and support agricultural institutions and processes for better communication of the sector’s needs, opportunities and challenges.

The MSc. AICM program was launched in 2008 at Egerton University and the University of Nairobi. Subsequent cohorts of students reported in 2009, 2010, 2011 and 2012. Haramaya University commenced implementation in 2010 and has had subsequent cohorts in 2011, 2012 and 2014. Makerere is launching the MSc AICM as an online programme beginning 2015. The details of the curriculum are available at <http://repository.ruforum.org/documents/masters-agricultural-information-communication-management>

### **Master’s Degree in Agrometeorology and Natural Risk Management at Haramaya University in Ethiopia**

Africa contributes the least to the global emissions of greenhouse gases and yet it is the most vulnerable to its effects, mainly because of its high dependence on rain-fed agriculture and the resultant low economic development, widespread poverty and weak capacity. The effects of climate change, such as reduced agricultural production and worsening food and nutrition insecurity, increased flooding and drought, increased occurrence of crop/animal/human epidemics and an increased risk of conflict over scarce and degraded land and water resources are already evident. It is, therefore, essential for the African countries to prepare themselves for coping with or, adapting to such adverse impacts and to ensure that such coping mechanisms and

adaptation measures and policies are built-in to their existing national and sectorial development activities. The focus of efforts in Africa now should be geared towards mainstreaming adaptation in national planning and marshalling supports for climate and other natural risk management strategies. However, the services of agro meteorology and risk management are not available to the required level in several African countries due to a number of constraints among which is inadequate skilled human resource and high turnover of experienced scientists and technicians. As a result, only a few professionals trained in agro meteorology and natural risk management are available in the region. There is, therefore, a dire need to build capacity through training of personnel at postgraduate degree level hence the launch of a Master's Degree in Agro meteorology and Natural Risk Management at Haramaya University in Ethiopia.

The programme aims at ensuring that there is a clear understanding of the relationships in the natural resources-plant-environment continuum (climate, crop, livestock, and natural risk management), reinforcing the reality that ensures food security and sustainability in natural resource use and natural risk management. The programme at Haramaya is a joint initiative by RUFORUM member Universities and involves students and staff from several countries in Eastern, Central and Southern Africa. With funding support from the ACP-EU Intra African Academic Mobility programme, the MSc programme is now also training students from West Africa.

### **Master's in Monitoring and Evaluation at Uganda Martyrs University, Nkozi, Uganda**

The need for quick results has led to an emphasis on fast impact assessment tools, usually without baseline data. Additionally the multitude of definitions of M&E has meant projects and programs can apply whatever tools and methods they know of, sometimes without clear understanding of the tools that are the most appropriate in the context being applied. But, if properly understood and used M&E systems offer powerful management tools in the public sector as well as other organizations. M&E systems can enhance accountability and, at the same time, provide a means for learning, in order to enhance and maximize outcomes and to help reach the goals set in a more efficient and effective manner. Enhanced accountability can contribute significantly to improving governance of public as well as other organizations.

Building a culture of monitoring and evaluation requires developing national M&E capacities. This entails strengthening both demand and supply capacities for equity-focused and gender-responsive evaluation at three levels: enabling environment, institutional capacities and individual capacities. Therefore the main objective of the MSc training is to produce top-level skilled professional staff with an interdisciplinary understanding of M&E, able to support analytical understanding of the impact of development initiatives in Africa and their comparison globally.